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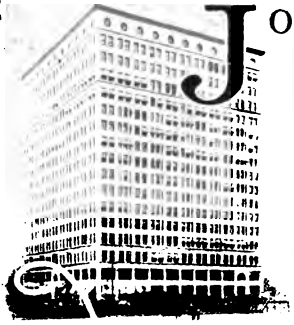

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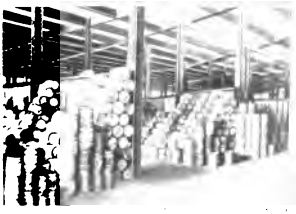

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Messrs. Joseph T. Ryerson & Son,
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We are certainly pleased to note the prompt handling of our order for the 18" Beams which we mailed you on Saturday, the 7th. You must have shipped these Beams within an hour after the order was received, for they arrived in Beaverville Monday morning.

We wish to thank you for your prompt handling of this order for us.

Yours very truly,
BEAVERVILLE [illegible] Co.

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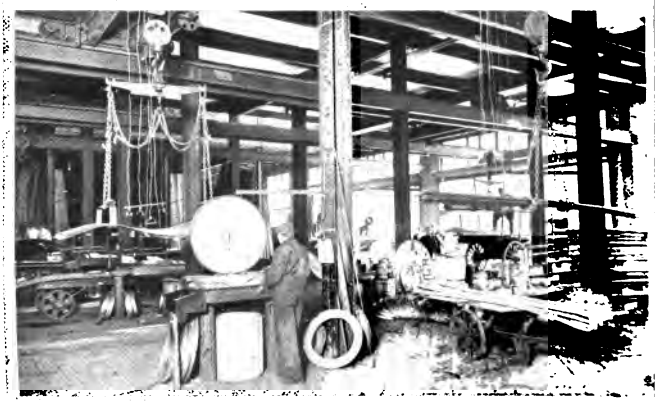
WORK ORDER SALES handles through its own order department a great variety of special orders requiring the transfer of plain material to outside shops for some semi-finishing or partial preparation to meet customers' needs. Our service here provides trained men to take full responsibility for accurate execution to specification, for prompt service and for expert inspection before shipment. Items of this kind can be shipped in combination with standard lines, at great economy of customers' time and handling expense.



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IN CONNECTION with our machinery manufacturing department, we maintain a regularly organized mechanical engineering staff, which makes a specialty of the study of shop conditions and methods and stands ready at all times to co-operate with our customers in the design and recommendation of equipment peculiarly adapted to the purchasers' manufacturing requirements.

MECHANICAL ENGINEERING DEPARTMENT

THE largest display room in this country and a complete stock of standard machines for at once shipment supplement our manufacturing facilities. Lathes, shapers, planers, boring mills, friction saws, bevel shears, etc., may be seen in operation, thus affording the prospective purchaser an opportunity of seeing each machine under service conditions and if desirable, actually tested on his work before buying.

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1—BARS

THIS bar section covers the largest and most varied stock available for immediate shipment. It includes the entire group of bar mill and associated products, ranging from billets and large rounds to lightest strip steel sizes.

This section is unique in making instantly accessible to the user, the several types of steel, which by their quality, finish or chemical content are especially suited to certain work.

The use of the group index on the next page is recommended in conjunction with the individual headings, to make easier the purchase of material suited to the work.

This section contains only descriptions and lists of material. Prices are given in Section 8, Weights in Section 9, and Data on the use of materials in Sections 10, 11 and 12.

1—BARS

	Page
Open Hearth Forging Billets.	101
Open Hearth Forging Bars, Rounds, Squares and Flats.	102
Nikrome C. H. Steel	104
Nikrome Forging Steel	104
Alloy Die Blocks	104
Open Hearth Reinforcing Bars	105
Wire	105
Free Cutting Rounds	106
.30-.40 Smooth Finished Rounds	106
Mild or Machine Steel Bars	107
Miscellaneous Bar Specialties, Bands, Scrolls, Hoops, Saw Blades, Wagon Box, etc.	112, 128
Galvanized Bars, Bands, Hoops, etc	114
Cold Drawn Steel	115
Cold Drawn Screw Steel	117
Cold Rolled Strip Steel	118
Cold Rolled Flat Wire	119
Tool Steel	120
Ulster and Ulster Special Iron	122
XX Engine Bolt Iron	124
Merchant Bar Iron	125
Swedish or Norway Iron	126
Tire	127

ASSOCIATED SUBJECTS

	Section
Bar Angles, Channels, Tees.	§ 2
Wire	§ 6
Work Order Department on Semi-Finished Bars	§ 6
Expanded Metal and Metal Lath	§ 6
Base Price	§ 8
Standard Mill Extra Classification	§ 8
Standard Warehouse and Cutting Extras	§ 8
Standard Specifications of Bars	§ 8
Weights of Steel and Iron Bars	§ 9
Heat Treatment of Steel Bars	§10
Heat Treatment of Tool Steel	§10

lete Alphabetical Index will be found on last four pages of the book.

OPEN HEARTH FORGING BILLETS

RYERSON "A" FORGING BILLETS

Corresponds to S. A. E. Specification No. 2.

These are open hearth forging billets .15 to .25 in carbon, phosphorus .04 or less, sulphur .04 or less. We recommend them for drop forge or general jobbing forge shop use. The quality of steel insures excellent case-hardened forgings.

SQUARES

Size in Inches	Average Stock	Size in Inches	Average Stock	Size in Inches	Average Stock
1¾	50	5	25	8	12
2	50	5½	25	8½	10
2½	50	6	20	9	6
3	30	6½	18	9½	6
4	30	7	12	10	4
4½	30	7½	16		

FLATS

Size in Inches	Average Stock	Size in Inches	Average Stock	Size in Inches	Average Stock
6×3	12	12×3	8	12×5	4
7×3	14	6×4	14	12×6	10
8×3	10	12×4	10	14×6	4
10×3	6	10×5	8	16×6	6

RYERSON "C" FORGING BILLETS

Approximates S. A. E. Specification No. 4.

These are open hearth forging billets, .35 to .45 in carbon, phosphorus .04 or less, sulphur .04 or less, for drop and forging use where great tensile strength is desired without sacrifice of toughness. Recommended for crank shafts, driving shafts, axles, etc. Will show good results under heat treatment.

SQUARES

Size in Inches	Average Stock	Size in Inches	Average Stock	Size in Inches	Average Stock
2	100	4½	25	8	12
2½	50	5	20	9	8
3	50	6	25	10	8
4	30	7	18		

RYERSON SPECIAL HIGH CARBON O. H. FORGING BILLETS

Carbon .50 to .60. Phosphorus .04. Sulphur .04.

4 inch Square. 6 inch Square. 8 inch Square.

FORGING BARS
RYERSON "A" FORGING ROUNDS

Corresponds to S. A. E. Specification No. 2.

This is guaranteed open hearth stock of the following analysis:

Carbon.... .15 to .25 Silicon. .20 or less Sulphur... .04 or less
Phosphorus .04 or less Manganese .50 to .80

We recommend this as the best possible quality for all-around forging. This stock will weld better than iron, will machine easily and take case-hardening better than other grades. It will also permit ordinary drawing and cold forming. It is a soft, ductile steel of about 35,000 pounds elastic limit.

Size in Inches	Avg. St'k, Bars	Size in Inches	Avg. St'k, Bars	Size in Inches	Avg. St'k, Bars	Size in Inches	Avg. St'k, Bars
1/2, 5/8, 3/4	100 Bdls. Each	1 5/8	200	2 3/4	40	5	15
7/8	400	1 3/4	150	3	50	5 1/4	15
1	600	1 7/8	100	3 1/4	40	5 1/2	15
1 1/8	300	2	150	3 1/2	30	5 3/4	15
1 1/4	400	2 1/8	50	3 3/4	20	6	15
1 3/8	200	2 1/4	80	4	30	7	15
1 1/2	300	2 3/8	50	4 1/4	30		
		2 1/2	60	4 1/2	15		
		2 5/8	50	4 3/4	15		

2 3/4 inches and under, 18 feet; 3 inches and over, 20 feet.

RYERSON "A" FORGING SQUARES

Size in Inches	Avg. St'k, Bars	Size in Inches	Avg. St'k, Bars	Size in Inches	Avg. St'k, Bars	Size in Inches	Avg. St'k, Bars
3/4	200	1 1/4	100	1 3/4	●	2 3/4	20
7/8	200	1 3/8	100	2	●	3	●
1	300	1 1/2	100	2 1/4	30	●Larger	●
1 1/8	150	1 5/8	50				

2 3/4 inches and under, 18 feet; 3 inches and over, 20 feet.

RYERSON "A" FORGING FLATS

Size in Inches	Size in Inches	Size in Inches	Size in Inches
1 ×3	1 ×6	1 1/4 × 4 1/2	1 1/2 × 4 1/2
1 ×3 1/2	1 1/4 × 3	1 1/4 × 5	1 1/2 × 5
1 ×4	1 1/4 × 3 1/2	1 1/2 × 3	2 ×3
1 ×4 1/4	1 1/4 × 4	1 1/2 × 3 1/2	2 ×3 1/2
1 ×4 1/2	1 1/4 × 4 1/4	1 1/2 × 4	2 ×4
1 ×5			●Larger

●See Billets, page 101.

FORGING BARS
CONTINUED

RYERSON "B" FORGING ROUNDS

Corresponds to S. A. E. Specification No. 3.

This is guaranteed open hearth stock of the following analysis:

Carbon.... .25 to .35 Silicon .. .20 or less Sulphur ... .04 or less
Phosphorus .04 or less Manganese. .50 to .80

This is recommended for structural parts of engines, machines, motors, etc., where a combination of high tensile strength and good toughness is desired. The steel forges well and machines well. It can be heat treated, but should not be case-hardened or welded. Elastic limit about 45,000 pounds.

Size in Inches	Avg. St'k, Bars	Size in Inches	Avg. St'k, Bars	Size in Inches	Avg. St'k, Bars	Size in Inches	Avg. St'k, Bars
¾	100	1½	200	2	100	2½	50
1	500	1¾	100	2¼	50	2¾	30
1¼	200	1⅞	50	2⅜	30	3	30

2¾ inches and under, 18 feet; 3 inches and over, 20 feet.

RYERSON "C" FORGING ROUNDS

Approximates S. A. E. Specification No. 4.

This is guaranteed open hearth stock of the following analysis:

Carbon.... .35 to .45 Silicon .. .20 or less Sulphur ... .04 or less
Phosphorus .04 of less Manganese. .50 to .80

This is the best carbon steel for work requiring great strength and with heat treatment combines great strength with toughness. It is well suited for crank shafts, driving shafts, axles, piston rods and similar service. Elastic limit, annealed, about 50,000 pounds; heat treated, about 90,000 pounds.

Size in Inches	Avg. St'k, Bars	Size in Inches	Avg. St'k, Bars	Size in Inches	Avg. St'k, Bars	Size in Inches	Avg. St'k, Bars
¾	300	1½	100	2¼	50	3½	20
⅞	300	1⅝	50	2⅜	50	4	20
1	400	1¾	100	2½	50	4¼	20
1⅛	200	1⅞	50	2¾	30	4½	20
1¼	300	2	100	3	30		
1⅜	300	2⅛	100	3¼	20		

2¾ inches and under, 18 feet; 3 inches and over, 20 feet.

ALLOY STEELS

NOTE.—THESE GRADES NOT YET IN CHICAGO. FURNISHED PROMPTLY FROM FACTORY STOCK.

NYKROME C. H. STEEL

This is a nickel chrome alloy, of great uniformity, low carbon, low phosphorus and sulphur, designed for case-hardened parts, such as cams, ball and roller bearings, gears, chuck jaws, lead screws, racks, bolts, studs, and other machine parts requiring maximum resistance to wearing of surface, combined with toughness of metal within surface case. It takes a hard, close-grained, better and deeper case than other alloys or carbon steels; can be quenched in water or oil to toughen core; can be handled without difficulty by those accustomed only to treating carbon steels. In addition, this steel can be readily machined—in contrast to 3½% nickel and other alloys.

We give below a typical physical specification of heat treated Nykrome steel. We are prepared to furnish Nykrome Case-Hardened Steel to specifications varying from that shown and in accordance with physical properties demanded.

CORE OF CASE-HARDENED BAR

Elastic Limit...lbs. per sq. in.,	110,000	Elongation in 2 inches.....	17.5%
Tensile Strength " " " "	130,000	Reduction of Area.....	57.5%

Elongation and tensile strength may be varied to suit requirements.

NYKROME FORGING STEEL

This is a nickel chrome steel, of great strength, elasticity and uniformity, designed for all forged parts which are to be heat treated to secure maximum strength and toughness. On account of its suitability for machine work, the simplicity and safety with which it can be heat treated, and its exceptional physical properties, it is rapidly displacing 3½% nickel and other alloys which require expert handling to produce equal strength value. It is well suited for gears, crank-shafts, piston-rods, driving shafts, axles, spindles, universal joints, connecting rods, pinions and other forged parts requiring maximum strength.

We give below a typical physical specification of heat treated Nykrome Forging Steel. We are prepared to furnish Nykrome Case-Hardened Steel to specifications varying from that shown and in accordance with physical properties demanded.

HEAT TREATED BAR

Elastic Limit...lbs. per sq. in.,	130,000	Elongation in 2 inches.....	17%
Tensile Strength " " " "	150,000	Reduction of Area.....	56%

Elongation and tensile strength may be varied to suit requirements.

RYERSON ALLOY DIE BLOCKS

These are die blocks of special alloy content, for use as dies, trimmers or punches in drop forge work. They can be machined without trouble and hardened in oil or brine without checks and breakage. Excellent economy can be secured as against carbon steel blocks by reason of longer life; elimination of breakage loss and resulting wasted machine work on carbon steel blocks. They can be furnished in all weights and sizes up to 5,000 pounds—annealed or unannealed.

OPEN HEARTH REINFORCING BARS

RYERSON COLD TWISTED SQUARES

These conform to Manufacturers' Standard Specifications; have elastic limit of about 55,000 pounds per square inch, low phosphorus, sulphur and carbon contents. These bars combine mechanical bond, greatest tensile strength and reinforcing value with greatest ductility.

Size in Inches	Stock Lengths	Size in Inches	Stock Lengths	Size in Inches	Stock Lengths
1/4	36, 45	9/16	36, 45	7/8	36, 45
5/16	36, 45	5/8	36, 45	1	36, 45
3/8	36, 45	11/16	36, 45	1 1/8	36, 45
7/16	36, 45	3/4	36, 45	1 1/4	36, 45
1/2	36, 45				

PLAIN OPEN HEARTH REINFORCING BARS

These conform to Manufacturers' Standard Specifications for plain reinforcing, having a minimum elastic limit of 33,000 pounds per square inch, and are of the same quality of steel above described.

ROUNDS		ROUNDS		SQUARES		SQUARES	
Size in Inches	Stock Lengths	Size in Inches	Stock Lengths	Size in Inches	Stock Lengths	Size in Inches	Stock Lengths
3/8	18	5/8	30, 36	1/4	20	11/16	30
3/8	22	3/4	30, 36	5/16	30	3/4	30
3/8	26	7/8	30, 36	3/8	30	7/8	30
3/8	30	1	30, 36	7/16	30	1	30
3/8	34	1 1/8	30, 36	1/2	30	1 1/8	30
1/2	30, 36	1 1/4	30, 36	9/16	30	1 1/4	30
				5/8	30		

BLACK FINISH ANNEALED WIRE

We offer any standard gauge for immediate shipment. This material is used for tying and spreading bars and for spiral column reinforcement.

See page 608 for fittings.

RYERSON FREE CUTTING ROUNDS

SEE ALSO HEXAGONS, PAGE 112

This is a clean grained steel, low in carbon (about .15 to .25) and a sulphur content (.075 to .10) which gives a free cutting quality and permits automatic machine work to be done with a minimum of wear to tools and an avoidance of tearing the stock.

Rounds, Size Inches	Length in Feet	Average Stock	Rounds, Size Inches	Length in Feet	Average Stock
7/16	13 and 18	500 bdls.	1 3/4	15 and 18	1000 bars
1/2	15 and 18	1500 "	1 7/8	18	300 "
9/16	13 and 18	500 "	2	15 and 18	500 "
5/8	18	2000 "	2 1/8	20	100 "
11/16	18	100 "	2 1/4	20	50 "
3/4	18	2000 "	2 3/8	20	30 "
7/8	18	1000 "	2 1/2	20	50 "
15/16	15 and 18	500 bars	2 5/8	20	40 "
1	15 and 18	2000 "	2 3/4	20	50 "
1 1/8	18	1000 "	3	20	50 "
1 1/4	15 and 18	1500 "	3 1/4	20	50 "
1 3/8	15 and 18	500 "	3 1/2	20	50 "
1 1/2	15 and 18	1000 "	3 3/4	20	30 "
1 5/8	15 and 18	300 "	4	20	40 "

RYERSON .30—.40 SMOOTH FINISHED ROUNDS

These are special hand rolled, planished or smooth surface and machine straightened bars of .30 to .40 carbon, low in phosphorus and sulphur, about .40 manganese and are rolled accurately to size. They are well suited for armatures, smooth finished spindles or shafts and other work where a stiff straight smooth bar is needed.

Size in Inches	Length in Feet	Average Stock	Size in Inches	Length in Feet	Average Stock
7/16	16	115 bars	1 5/8	16	50 bars
1/2	16	210 "	1 3/4	16	80 "
9/16	16	80 "	1 7/8	16	50 "
5/8	16	210 "	2	16	60 "
11/16	16	50 "	2 1/8	16	40 "
3/4	16	240 "	2 1/4	16	30 "
7/8	16	270 "	2 3/8	16	50 "
1	16	310 "	2 1/2	16	20 "
1 1/8	16	190 "	2 5/8	16	30 "
1 1/4	16	230 "	2 3/4	16	30 "
1 3/8	16	140 "	3	16	30 "
1 1/2	16	120 "			

MILD STEEL BARS

CONTINUED

FLATS

Size in Inches	Length in Feet	Average Stock
3-16× 3/8	11,12 and 13	190bdls.
× 1/2	11,12 and 13	420 "
× 5/8	11,12 and 13	600 "
× 3/4	11,12 and 13	750 "
× 7/8	11,12 and 13	600 "
×1	13,15 and 16	2000 "
×1 1/8	13,15 and 16	950 "
×1 1/4	13,15 and 16	1500 "
×1 3/8	13,15 and 16	350 "
×1 1/2	13,15 and 16	1200 "
×1 3/4	13,15 and 16	400 "
×2	14 and 16	150 "
×2	scrolled	600 "
×2 1/4	14 and 16	100 "
×2 1/4	scrolled	350 "
×2 1/2	14 and 16	130 "
×2 1/2	scrolled	500 "
×2 3/4	14 and 16	100 "
×2 3/4	scrolled	150 "
×3	14,16 and 30	240bars
×3	scrolled	225bdls.
×3 1/4	14,16 and 30	220bars
×3 1/2	14,16 and 30	450 "
×3 1/2	scrolled	700bdls.
×4	14,16 and 30	320bars
×4	scrolled	460bdls.
×4 1/2	14,16 and 30	310bars
×4 1/2	scrolled	300bdls.
×5	14,16 and 30	140bars
×5	scrolled	400bdls.
×5 1/2	14,16 and 30	120bars
×5 1/2	scrolled	360bdls.
×6	14,16 and 30	260bars
×6	scrolled	450bdls.
1-4× 3/8	14,16 and 30	135bdls.
× 1/2	11 and 13	140 "
1-4× 5/8	11 and 13	100bdls.
× 3/4	11,12 and 13	700 "
× 7/8	11 and 13	170 "
×1	12,14 and 16	3000 "
×1 1/8	12,14 and 16	250 "
×1 1/4	12,14 and 16	1200 "
×1 3/8	12,14 and 16	150 "
×1 1/2	12,14 and 16	9900 "
×1 3/4	12,14 and 16	510 "
×2	12,14 and 16	7000bars
×2 1/4	12,14 and 16	1000 "
×2 1/2	12,14 and 16	2300 "
×2 3/4	12,14 and 16	700 "
×3	14 and 16	1900 "
×3 1/4	16	1200 "
×3 1/2	14 and 16	600 "
×3 3/4	15 and 16	60 "
×4	14 and 16	1800 "
×4 1/2	16	270 "
×5	16 and 30	1200 "
×5 1/2	16	490 "
×6	16 and 30	2100 "
5-16× 1/2	11 and 13	110bdls.
× 5/8	11 and 13	50 "
× 3/4	11 and 13	120 "
× 7/8	11 and 13	50 "
×1	16	410 "
×1 1/8	16	590 "
×1 1/4	16	6000bars
×1 3/8	16	1000 "
×1 1/2	16	9900 "
×1 3/4	14 and 16	1200 "
×2	14 and 16	700 "
×2 1/4	14 and 16	740 "
×2 1/2	16	990 "
×2 3/4	14 and 16	600 "

MILD STEEL BARS
CONTINUED

FLATS
CONTINUED

Size in Inches	Length in Feet	Average Stock	Size in Inches	Length in Feet	Average Stock
1 3-4×3	14 and 16	50bars	2×3	14 and 16	150bars
×3½	14 and 16	110 "	×3½	14 and 16	140 "
×4	14 and 16	100 "	×4	14 and 16	150 "
×5	14 and 16	50 "	×4½	14 and 16	125 "
×6	14 and 16	75 "	×5	14 and 16	60 "
			×6	14 and 16	75 "
2×2½	14 and 16	170 "	2 1-2×3	14, 15′ 3″, 16	100 "

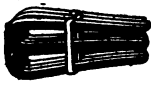
HEXAGONS

This stock is also carried in a grade corresponding to Free Cutting Rounds, page 106, and is well suited for screw machine work.

Size in Inches	Length in Feet	Average Stock	Size in Inches	Length in Feet	Average Stock
½	18	30 bdls.	1¼	18	220 bars
9/16	18	30 "	1⅜	18	150 "
⅝	18	120 "	1½	18	100 "
¾	18	130 "	1⅝	18	100 "
⅞	18	400 bars	1¾	18	30 "
1	18	300 "	1⅞	18	70 "
1⅛	18	140 "	2	18	45 "

MILD STEEL BANDS
BANDS IN STRAIGHT LENGTHS

Gauge Number	Width in Inches	Length in Feet	Lineal Feet, Average Stock	Gauge Number	Width in Inches	Length in Feet	Lineal Feet, Average Stock
12	½	14 and 16	48200	10	⅞	14 and 16	2450
	⅝	14 and 16	10800		1	14 and 16	5800
	¾	14 and 14	14400		1⅛	14 and 16	8600
	1	14 and 16	28700		1¼	14 and 16	6200
	1¼	14 and 16	17400		1⅜	14 and 16	8000
	1½	14 and 16	18200		1½	14 and 16	12200
	1¾	14 and 16	9600		1¾	14 and 16	4000
	2	14 and 16	11600		2	14 and 16	10600
	2¼	14 and 16	19800		2¼	14 and 16	900
	2½	14 and 16	5500		2½	14 and 16	5600
	3	14 and 16	6800		2¾	14 and 16	2800
	3½	14 and 16	7000		3	14 and 16	6700
	4	14 and 16	19400		3½	14 and 16	4000
					4	14 and 16	1600
10	½	14 and 16	44000		5	14 and 16	10000
	⅝	14 and 16	36000		6	14 and 16	5000
	¾	14 and 16	10600				



MILD STEEL BANDS
CONTINUED

BANDS IN SCROLLS

Gauge Number	Width in Inches	Number Bundles, Average Stock	Gauge Number	Width in Inches	Number Bundles, Average Stock	Gauge Number	Width in Inches	Number Bundles, Average Stock
12	1/2	125	12	3 1/2	330	10	2	800
	5/8	100		4	135		2 1/4	140
	3/4	160					2 1/2	400
	7/8	205	10	3/8	205		2 3/4	190
	1	370		1/2	400		3	500
	1 1/8	70		5/8	500		3 1/4	200
	1 1/4	200		3/4	600		3 1/2	300
	1 1/2	160		7/8	500		4	250
	1 3/4	95		1	1000		4 1/2	95
	2	200		1 1/8	400		5	230
	2 1/4	40		1 1/4	500		5 1/2	205
	2 1/2	505		1 3/8	250		6	120
	2 3/4	95		1 1/2	500		7	200
	3	280		1 3/4	200		8	200

GALVANIZED BANDS

We can offer prompt shipment of all stock bands galvanized to order.

STONE SAW BLADES

Gauge Number	Length in Feet	Average Stock	Gauge Number	Length in Feet	Average Stock
1/8×4	14 1/2	70 bdls.	1/8×4	15 1/2	65 bdls.
1/8×4	15	75 "			

BEVEL EDGE WAGON BOX IRON

Gauge Number	Width in Inches	Average Stock	Gauge Number	Width in Inches	Average Stock
14	3/4	240 bdls.	12	7/8	200 bdls.
12	3/4	160 "			

SOFT STEEL HOOPS

Gauge Number	Width, Inches	Average Stock, Bundles	Gauge Number	Width, Inches	Average Stock, Bundles	Gauge Number	Width, Inches	Average Stock, Bundles
22	½	400	19	1½	340	16	1⅛	100
	⅝	500		1¾	500		1¼	105
	¾	500	18	½	50	16	1½	300
	⅞	1000		⅝	50		1¾	140
	1	500		¾	195		2	180
	1¼	500		⅞	310		2¼	100
				1	75		2½	110
20	½	350		1⅛	150		3	500
	⅝	200		1¼	290			
	¾	380		1½	200	14	½	365
	⅞	140		1¾	230		⅝	230
	1	500		2	180		¾	100
	1¼	380		2½	295		⅞	260
	1½	160		2¾	93		1	255
				3	65		1⅛	300
19	½	50					1¼	200
	⅝	50	16	⅜	195		1½	280
	¾	50		½	220		1¾	110
	⅞	50		⅝	310		2	150
	1	300		¾	508		2¼	150
	1⅛	510		⅞	220		2½	220
	1¼	820		1	145		3	190

No. 14 Gauge hoops furnished in scrolls. All other sizes in coils.

Galvanized Stock Hoops promptly furnished on order.

GALVANIZED BARS, BANDS, HOOPS, ETC.

In connection with the galvanized angles and galvanized sheets which we carry in stock, we have excellent facilities for furnishing galvanized channels, bands, hoops and bars, or in fact galvanized material of any kind.

We can also furnish promptly sherardized or electro-plated rivets, bolts, flanges, etc.

Galvanized pump rods are carried in stock ⅜ inch, $\frac{7}{16}$ inch and ½ inch in diameter, 18 feet long.

COLD DRAWN STEEL

These are smooth, bright surface, cold drawn bars, finished to a variation limit of .015 inch under size. This stock is stored in an even temperature and kept carefully oiled to prevent rust, and is also kept straight by storage in special racks.

ROUND SHAFTING

A medium carbon grade of clean grained steel to give stiff, strong shafts that can be readily machined. This stock includes all even foot lengths commonly used and permits great saving in waste.

Diam. Inches	Length in Feet	Avg. St'k Lineal Ft.	Diam. Inches	Length in Feet	Avg. St'k Lineal Ft.
3/16	10, 12	40,000	1 1/2	10, 12, 14, 16, 18,	
7/32	10	37,000		20, 24, 28	15,000
1/4	10, 12, 16	110,000	1 9/16	12, 14, 16, 20, 24	3,950
9/32	10	52,000	1 5/8	10, 12, 14, 16, 20, 24	800
5/16	10, 12, 16	98,000	1 11/16	10, 12, 14, 16, 18,	
11/32	10	43,500		20, 22, 24, 28	6,600
3/8	10, 12, 16	76,000	1 3/4	10, 12, 14, 16, 18,	
13/32	10	27,000		20, 24	3,200
7/16	10, 12, 16, 20	32,000	1 13/16	16, 20, 24	4,200
15/32	10	27,000	1 7/8	10, 12, 14, 16, 20, 24	4,000
1/2	10, 12, 16, 20	76,000	1 15/16	10, 12, 14, 16, 18,	
17/32	10	25,100		20, 22, 24, 28	13,600
9/16	10, 12, 16, 20	24,500	2	10, 12, 14, 16, 20,	
19/32	10	22,100		24, 30	6,600
5/8	10, 12, 14, 16, 20	64,000	2 1/16	16, 20, 24	2,900
21/32	10	19,950	2 1/8	10, 12, 14, 16. 20, 24	3,000
11/16	10, 12, 14, 16, 20	15,800	2 3/16	10, 12, 14, 16, 18,	
23/32	10	53,000		20, 22, 24, 28	5,000
3/4	10, 12, 14, 16, 18, 20,		2 1/4	10, 12, 14, 16, 20,	
	24	54,000		24, 30	1,360
25/32	10	26,500	2 5/16	16, 20, 24	540
13/16	10, 12, 14, 16, 20, 24	1,200	2 3/8	10, 12, 16, 20	800
27/32	10	8,800	2 7/16	10, 12, 14, 16, 18,	
7/8	12, 14, 16, 18, 20, 24	34,000		20, 22, 24, 28	8,300
29/32	10	9,900	2 1/2	10, 12, 14, 16, 18,	
15/16	10, 12, 14, 16, 18,			20, 24, 30	3,380
	20, 24	5,600	2 9/16	10, 12, 14, 16, 20,	
31/32	10	12,550		24	1,020
1	10, 12, 14, 16, 18,		2 5/8	10, 12, 16, 20, 24	720
	20, 24	44,600	2 11/16	12, 14, 16, 18, 20,	
1 1/16	10, 12, 16, 20, 24	2,700		22, 24	1,200
1 1/8	10, 12, 14, 16, 20, 24	22,800	2 3/4	10, 12, 16, 20, 24	1,200
1 3/16	10, 12, 14, 16, 18,		2 13/16	16, 20, 24	260
	20, 22, 24	7,500	2 7/8	16, 20, 24	1,440
1 1/4	10, 12, 14, 16, 18,		2 15/16	10, 12, 14, 16, 18,	
	20, 24	31,200		20, 22, 24, 28, 30	5,500
1 5/16	10, 12, 14, 16, 20, 24	3,000	3	10, 12, 14, 16, 18,	
1 3/8	10, 12, 14, 16, 20, 24	4,800		20, 22, 24, 30	1,750
1 7/16	10, 12, 14, 16, 18,		3 1/16	16, 20, 24	510
	20, 22, 24, 28	10,300	3 1/8	10, 12, 16, 18, 20	300

COLD DRAWN STEEL — CONTINUED
ROUND SHAFTING—CONTINUED

Diam. Inches	Length in Feet	Ave. St'k Lineal Ft.	Diam. Inches	Length in Feet	Avg. St'k Lineal Ft.
3 3/16	10, 12, 14, 16, 18, 20, 22, 24, 28	650	4	16, 20, 24	400
3 1/4	10, 12, 16, 20	650	4 1/8	16, 24	150
3 5/16	16, 20	510	4 3/16	12, 16, 20, 24	120
3 3/8	16, 20, 24	610	4 1/4	16, 20, 24	200
3 7/16	12, 13, 14, 16, 18, 20, 22, 24, 28	1,400	4 7/16	12, 16, 20, 24	660
3 1/2	10, 12, 14, 16, 20, 24	600	4 1/2	16, 20	60
3 9/16	16, 24	200	4 11/16	24	90
3 5/8	16, 20, 24	100	4 3/4	16, 24	100
3 11/16	16, 20, 24, 28	200	4 15/16	12, 16, 20, 24	250
3 3/4	16, 20, 24	100	5	12, 16, 20, 24	100
3 13/16	16, 24	210	5 1/16	16, 20, 24	150
3 7/8	16, 20, 24	300	5 1/2	16, 24	200
3 15/16	10, 12, 14, 16, 18, 20, 22, 24, 28	750	5 15/16	16, 20, 24	90
			6	16, 24	150

COLD DRAWN FLATS

We have for immediate shipment a complete range of the standard sizes in flats. They are accurately drawn with square edges and parallel sides. As the list is a very long one, we have omitted them to save space.

COLD DRAWN SQUARES

Diam. Inches	Length in Feet	Avg. St'k Lineal Ft.	Diam. Inches	Length in Feet	Avg. St'k Lineal Ft.
3/16	10, 12	15,000	11/16	10, 12	300
1/4	10, 12	36,000	1	12, 20	9,000
5/16	10, 12	48,000	1 1/8	12, 20	500
3/8	10, 12	24,000	1 1/4	12, 20	2,500
7/16	10, 12	3,300	1 5/16	16	500
1/2	10, 12	12,000	1 3/8	10, 12	320
9/16	10, 12	2,400	1 1/2	12, 20	900
5/8	10, 12	12,000	1 5/8	16	320
11/16	10, 12	4,000	1 3/4	16	160
3/4	10, 12	4,800	2	16	160
7/8	10, 12	2,500			

RYERSON "A" COLD DRAWN ROUNDS

This is a low carbon, .12 to .20 carbon, cold drawn steel suitable for case-hardening requirements.

Diameter, Inches	Length in Feet	Diameter, Inches	Length in Feet	Diameter, Inches	Length in Feet
7/8	10	1 5/16	10	1 11/16	10
15/16	10	1 3/8	10	1 3/4	10
1	10	1 7/16	10	1 13/16	10
1 1/16	10	1 1/2	10	1 7/8	10
1 1/8	10	1 9/16	10	1 15/16	10
1 3/16	10	1 5/8	10	2	10
1 1/4	10				

COLD DRAWN STEEL—CONTINUED
RYERSON "C" COLD DRAWN ROUNDS

This is a high carbon, .35 to .45 carbon, cold drawn steel suitable for parts where high elastic limit is desired, such as automobile axles.

Diameter, Inches	Length in Feet	Diameter, Inches	Length in Feet	Diameter, Inches	Length in Feet
3/4	20	1 1/4	20	1 1/2	20
7/8	20	1 5/16	20	1 5/8	20
1	20	1 3/8	20	1 3/4	20
1 3/16	20	1 7/16	20	2	20
1 1/8	20				

COLD DRAWN SCREW STEEL
COLD DRAWN ROUNDS

This is an accurate, bright finish stock for small fittings, bolts, and similar work, on automatics and screw machines, where a free cutting quality, similar to that of Ryerson Free Cutting Bars, must be combined with the bright accurate finish of the cold rolled bar. Sizes 1 inch and smaller, 10 foot lengths; 1 inch and larger, 16 foot lengths.

Diam. Inches	Length, Feet	Avg. St. Lin. Ft.	Diam. Inches	Length, Feet	Avg. St. Lin. Ft.	Diam. Inches	Length, Feet	Avg. St. Lin. Ft.
5/32	10	40,000	11/16	10	2,000	1 5/16	16	1,000
3/16	10	40,000	23/32	10	1,250	1 3/8	16	1,600
7/32	10	65,000	3/4	10	8,000	1 7/16	16	800
1/4	10	40,000	25/32	10	1,750	1 1/2	16	1,600
9/32	10	40,000	13/16	10	4,000	1 9/16	16	400
5/16	10	50,000	27/32	10	2,750	1 5/8	16	1,600
11/32	10	30,000	7/8	10	7,000	1 11/16	15	500
3/8	10	40,000	29/32	10	2,250	1 3/4	16	800
13/32	10	25,000	15/16	10	2,000	1 13/16	16	800
7/16	10	10,000	31/32	10	2,000	1 7/8	16	1,200
15/32	10	9,000	1	10	3,000	1 15/16	16	400
1/2	10	20,000	1	16	3,000	2	16	1,600
17/32	10	3,000	1 1/32	16	5,500	2 1/8	16	1,000
9/16	10	14,000	1 1/16	16	1,600	2 1/4	16	800
19/32	10	2,000	1 1/8	16	2,000	2 3/8	16	600
5/8	10	9,000	1 3/16	16	1,600	2 1/2	16	800
21/32	10	2,750	1 1/4	16	1,600			

COLD DRAWN HEXAGONS

Diam. Inches	Length, Feet	Avg. St. Lin. Ft.	Diam. Inches	Length, Feet	Avg. St. Lin. Ft.	Diam. Inches	Length, Feet	Avg. St. Lin. Ft.
1/4	10	1,000	1	12	1,600	1 13/16	20	300
5/16	10	3,000	1 1/16	10, 20	3,000	1 7/8	20	400
3/8	12	4,000	1 1/8	12, 20	2,000	1 15/16	20	60
7/16	10, 12	5,000	1 1/4	12, 20	1,600	2	20	140
1/2	10, 12	10,000	1 3/8	10, 20	800	2 1/8	20	60
9/16	10, 12	5,000	1 1/2	12, 20	800	2 1/4	20	100
5/8	10, 12	5,000	1 5/8	20	320	2 3/8	20	40
11/16	10, 12	2,000	1 5/8	20	500	2 1/2	20	100
3/4	10, 12	5,000	1 11/16	20	300	2 3/4	20	60
7/8	10, 12	2,000	1 3/4	12, 20	800	3	20	60
15/16	10	800						

COLD ROLLED STRIP STEEL

This is a steel in strip form from 6 inches to 12 inches width, and from .012 inch to .50 or ½ inch thickness; accurate to size with a smooth bright surface finish secured by repeated cold rolling and annealing. By selection of the base stock and different annealing various grades of stiffness and softness are secured.

By its graded softness it is excellent material for deep drawing, forming, press or blanking work and by reason of surface finish for brass, nickel-plated and oxidized finish: It is recommended for plumbing and shelf hardware; cutlery, bicyle, typewriter, motorcycle fixtures and auto parts, cash registers, metal novelties, etc. We suggest sending sample of work and covering the following points:

1. Quantity—in weight and number of pieces.

2. Sizes—thickness in decimals of an inch or Birmingham gauge numbers; width and length in inches. Stock lengths are furnished unless customer specifies cut lengths and assumes charges.

3. Quality—Grade of hardness and character of work. Special lengths, gauges, tempers and widths can be furnished from the mill.

DEAD SOFT COLD ROLLED STEEL—8 FOOT LENGTHS

6 inch	×.500	6 inch	×.120	12 inch	×.065	8 inch	×.035	6 inch	×.022
6 "	×.375	12 "	×.109	8 "	×.065	6 "	×.035	12 "	×.020
12 "	×.250	8 "	×.109	6 "	×.065	12 "	×.032	8 "	×.020
6 "	×.250	6 "	×.109	12 "	×.058	8 "	×.032	6 "	×.020
6 "	×.187	12 "	×.095	8 "	×.058	6 "	×.032	12 "	×.018
12 "	×.187	8 "	×.095	6 "	×.058	12 "	×.028	8 "	×.018
6 "	×.165	6 "	×.095	12 "	×.050	8 "	×.028	6 "	×.018
6 "	×.156	12 "	×.083	8 "	×.050	6 "	×.028	6 "	×.016
6 "	×.148	8 "	×.083	6 "	×.050	12 "	×.025	6 "	×.014
6 "	×.134	6 "	×.083	12 "	×.042	8 "	×.025	6 "	×.012
12 "	×.125	12 "	×.072	8 "	×.042	6 "	×.025		
8 "	×.125	8 "	×.072	6 "	×.042	12 "	×.022		
6 "	×.125	6 "	×.072	12 "	×.035	8 "	×.022		

HALF HARD COLD ROLLED STEEL—6 FOOT LENGTHS

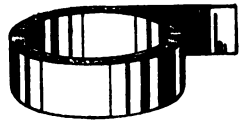
6 inch × .125	6 inch × .072	6 inch × .050	6 inch × .028
6 " × .109	6 " × .065	6 " × .042	6 " × .025
6 " × .095	6 " × .058	6 " × .035	6 " × .020
6 " × .083		6 " × .032	

HARD COLD ROLLED STEEL—6 FOOT LENGTHS

6 inch × .125	6 inch × .083	6 inch × .058	6 inch × .032
6 " × .109	6 " × .072	6 " × .050	6 " × .025
6 " × .095	6 " × .065	6 " × .042	6 " × .028
		6 " × .035	6 " × .020

Special lengths, gauges, tempers and widths can be furnished from the mill. We recommend that customers describe the work for which material is required so that correct grade can be furnished.

COLD ROLLED FLAT WIRE



We can furnish immediately from stock the sizes shown below in round edge quality, in straightened twelve-foot lengths or coils. This stock is specified not to exceed .002 inches over or under listed thickness and .005 inches to .010 inches over or under listed width. Special quality, size and finish can be shipped promptly from mill.

No. 2 or half hard temper. No. 3 Bright Finish.
No. 4 Round Edge.

COILS

2/16×No. 16	1/2×No. 12	5/8×1/8 inch	1 1/8×.025 inch
1/4×No. 16	1/2×No. 14	3/4×1/8 inch	.....
5/16×No. 16	1/2×No. 16	3/4×.018 inch	.....
3/8×No. 16	1/2×No. 20	1 ×.023 inch	.....

STRAIGHTENED AND CUT

1/4×No. 16	1/2×3/32 inch	5/8×No. 16	3/4×No. 18
5/16×No. 16	1/2×No. 16	5/8×No. 18	3/4×No. 20
5/8×1/8 inch	1/2×No. 18	5/8×No. 20	1 ×2/16 inch
3/8×No. 16	1/2×No. 20	3/4×3/16 inch	1 ×1/8 inch
3/8×No. 20	5/8×3/16 inch	3/4×1/8 inch	1 ×No. 16
1/2×3/16 inch	5/8×1/8 inch	3/4×3/32 inch	1 ×No. 20
1/2×1/8 inch	5/8×3/32 inch	3/4×No. 16	.....

Special lengths, gauges, tempers and widths can be furnished from the mill. We recommend that customers describe the work for which material is required so that correct grade can be furnished.

TOOL STEEL

Our stock of tool steel comprises all the commonly used sizes of various grades, in ample quantity to insure immediate shipment. For the convenience of the trade we have shown a summary of these sizes. By means of a complete electrical hardening furnace our tool steel department can harden bars or customers' tools at small extra charge. Complete details in our Technical Library No. Ten.

When ordering always state for what purpose steel is to be used to enable us to send proper temper.

SPECIAL HIGH SPEED TOOL STEEL

See page 1020 for Forging and Hardening.

Uses: For lathe, planer, boring, slotting and other roughing tools; also twist drills, milling cutter, taps, reamers, punches, hot shearing, drawing dies, stamping dies, threading dies, etc.

Rounds—¼ inch to 1 inch by 32nds.
Rounds—1 inch to 3 inches by 16ths.
Rounds—3 inches to 7 inches by 4ths.
Squares—$\frac{3}{16}$ inch to 1 inch by 16ths.
Squares—1 inch to 4 inches by 8ths.
Flats—¼ x ½ inch to 1½ x 3 inches by 16ths.

Sizes not shown, furnished promptly from mill stock.

HIGH SPEED TOOL STEEL

See page 1020 for Forging and Hardening.

Uses: Same as Special High Speed Tool Steel, and recommended where shops are not equipped to work Special High Speed to its full capacity.

Rounds—¼ inch to 1 inch by 32nds.
Rounds—1 inch to 3 inches by 16ths.
Rounds—3 inches to 7 inches by 4ths.
Squares—$\frac{3}{16}$ inch to 1 inch by 16ths.
Squares—1 inch to 4 inches by 8ths.
Flats—¼ x ½ inch to 1½ x 3 inches by 16ths.

Sizes not shown, furnished promptly from mill stock.

RYERSON MILL TREATED TOOL STEEL

High speed steel, already hardened, two-foot bars. All standard sizes for tool holders.

RYERSON TOOL HOLDER BITS

High speed steel, already hardened, tool-holder lengths. All standard sizes for tool holders.

TOOL STEEL
CONTINUED

XXX CARBON TOOL STEEL

See page 1020 for Forging and Hardening.

Uses: For Finishing Tools for lathe and planer, also high grade wood working tools, shear blades, punches, taps, reamers, and all kinds of stamping, drawing, threading dies, etc.

Rounds—¼ inch to 1 inch by 16ths.
Rounds—1 inch to 3 inches by 8ths.
Rounds—3 inches to 7 inches by 4ths.
Squares—¼ inch to 1 inch by 16ths.
Squares—1 inch to 4 inches by 8ths.
Flats—⅛ x ⅜ inch to 2 x 3 inches by 16ths.

Sizes not shown, furnished promptly from mill stock.

XX CARBON TOOL STEEL

See page 1020 for Forging and Hardening.

Uses: A medium grade steel for wood working tools, shear blades, punches, rivet sets, chisels, lathe finishing tools, taps, reamers, drawing, stamping, threading and all kinds of dies, etc.

Rounds—¼ inch to 3 inches by 16ths.
Rounds—3 inches to 7 inches by 8ths.
Squares—¼ inch to 2 inches by 16ths.
Squares—2 inches to 6 inches by 8ths.
Octagons—¼ inch to 2 inches by 16ths.
Hexagons—½ inch to 2 inches by 8ths.
Flats—⅛ x ⅜ inch to 2½ x 10 inches by 16ths.

Sizes not shown, furnished promptly from mill stock.

X CARBON TOOL STEEL

See page 1020 for Forging and Hardening.

A standard steel for chisels, crowbars, track tools, smith shop tools, swages, rivet sets and boiler maker tools, etc.

Rounds—¼ inch to 2 inches by 16ths.
Rounds—2 inches to 6 inches by 8ths.
Squares—¼ inch to 1 inch by 16ths.
Squares—1 inch to 3 inches by 8ths.
Octagons—¼ inch to 2 inches by 16ths.
Hexagons—½ inch to 2 inches by 8ths.

Sizes not shown, furnished promptly from mill stock.

DRILL STEEL

See page 1020 for Forging and Hardening.

Used for rock and mining drilling.

Rounds—½ inch to 2 inches by 16ths.
Octagons—½ inch to 2 inches by 16ths.

Sizes not shown, furnished promptly from mill stock.

"ULSTER" SPECIAL STAYBOLT IRON
"ULSTER" ENGINE BOLT IRON

"ULSTER" is one of the oldest brands of iron made in the United States. Its superior quality has long been acknowledged on account of its solidity, toughness, strength and reliable uniformity. "Ulster" is well adapted to all uses, but is peculiarly suited to meet conditions where requirements are exacting. It will stand nearly its TENSILE STRENGTH before stretching—certainly a wonderful showing of tenacity and toughness of fiber.

The reputation of "Ulster" and "Ulster Special" iron is secure, founded on the always dependable and consistent care that is taken in procuring superior materials for their manufacture and then in giving them a uniform and thorough working. Ductility is not sacrificed to excessive tensile strength, nor is the solidity or strength of the iron sacrificed to excessive softness or facility in mechanical working. "Ulster" is well known and appreciated for its reliability in workshops of the prominent railroads, engine builders, boiler makers and machinists. "Ulster" is constantly proving its reputation.

"Ulster" tested in the original section will show a minimum tensile strength of 48,000, or if desired 50,000; a minimum elongation of 25 per cent in 8 inches and an elastic limit of not less than 35,000 for section 1¼ inches round and under.

"Ulster" Special Staybolt Iron is the highest grade of staybolt iron made. In construction this iron has a full, coarse fiber and is of as high tensile strength as is compatible with this grade of material, none of it being less than 48,000, and a large proportion of the output is furnished on specifications requiring 50,000 tensile as the minimum. Elongation is 28 per cent, though a large proportion of the output is furnished on specifications requiring 30 per cent as the minimum with an elastic limit fully 70 per cent of the ultimate tensile; in fact in staybolt sizes up to 1¼ inches round we have no difficulty in obtaining a minimum 35,000 when tested in the original section. Both "Ulster" and "Ulster Special" will stand bending double flat on itself without showing fracture or flaw.

The test figures above mentioned are for the usual round iron in customary sizes for staybolt and engine bolt purposes when tested in the original section. For other sections, such as flats, squares, hexagons or sections that are reduced in area for testing purposes, the usual allowances from any of the above physical factors should be made.

ULSTER SPECIAL STAYBOLT IRON

Sizes	Average Stock	Sizes	Average Stock	Sizes	Average Stock
5/8 Round	150 bars	1 1/16 Round	140 bars	1 1/2 Round	160 bars
3/4 "	395 "	1 1/8 "	600 "	1 5/8 "	110 "
13/16 "	250 "	1 3/16 "	350 "	1 3/4 "	60 "
7/8 "	265 "	1 1/4 "	680 "	1 7/8 "	120 "
15/16 "	150 "	1 5/16 "	100 "	2 "	50 "
1 "	160 "	1 3/8 "	255 "		

Length varies from 15 to 17 feet.

ULSTER ENGINE BOLT IRON

Sizes	Average Stock	Sizes	Average Stock	Sizes	Average Stock
3/8 Round	20 bdls.	1 Round	680 bars	1 5/8 Round	135 bars
1/2 "	35 "	1 1/16 "	150 "	1 3/4 "	135 "
5/8 "	45 "	1 1/8 "	570 "	1 7/8 "	160 "
11/16 "	20 "	1 3/16 "	420 "	2 "	120 "
3/4 "	840 bars	1 1/4 "	310 "	2 1/4 "	100 "
13/16 "	140 "	1 3/8 "	210 "	2 1/2 "	90 "
7/8 "	7000 "	1 1/2 "	180 "	3 x 1 Flat	70 "
15/16 "	330 "				

Length varies from 15 to 17 feet.

SIZES OF ULSTER AND ULSTER SPECIAL WHICH WE CAN FURNISH FROM MILL

ROUNDS

3/8 to 4 inches in diameter varying by sixteenths.

SQUARES

3/8 to 4 inches in diameter varying by sixteenths.

FLATS

3/4 x 1/4 inch to 8 x 1 1/2 inch.

XX ENGINE BOLT IRON

This is a clean, solid, uniform iron, free from cracks, flaws and seams, and one which is manufactured expressly for engine bolt purposes.

The iron is regular in quality and will take a full clean thread. The standard iron has minimum tensile strength of 55,000 pounds per square inch and elongation of not less than 25% in 8 inches. We, however, can furnish iron to meet special requirements, if desired.

ROUNDS

SIZES

1/4	33/64	49/64	1 1/32	1 9/16	2 9/16	3 9/16
9/32	17/32	25/32	1 1/16	1 5/8	2 5/8	3 5/8
19/64	35/64	51/64	1 3/32	1 11/16	2 11/16	3 11/16
5/16	9/16	13/16	1 1/8	1 3/4	2 3/4	3 3/4
21/64	37/64	53/64	1 5/32	1 13/16	2 13/16	3 13/16
11/32	19/32	27/32	1 1/16	1 7/8	2 7/8	3 7/8
23/64	39/64	55/64	1 7/32	1 15/16	2 15/16	3 15/16
3/8	5/8	7/8	1 1/4	2	3	4
25/64	41/64	57/64	1 9/32	2 1/16	3 1/16	4 1/16
13/32	21/32	29/32	1 5/16	2 1/8	3 1/8	4 1/8
27/64	43/64	59/64	1 11/32	2 3/16	3 3/16	4 1/4
7/16	11/16	15/16	1 3/8	2 1/4	3 1/4	4 1/2
29/64	45/64	61/64	1 13/32	2 5/16	3 5/16	4 3/4
15/32	23/32	31/32	1 7/16	2 3/8	3 3/8	
31/64	47/64	63/64	1 15/32	2 7/16	3 7/16	
1/2	3/4	1	1 1/2	2 1/2	3 1/2	

HEXAGONS

SIZES

9/32	15/32	21/32	27/32	1 1/8	1 1/2	1 7/8
5/16	1/2	11/16	7/8	1 3/16	1 9/16	1 15/16
11/32	17/32	23/32	29/32	1 1/4	1 5/8	2
3/8	9/16	3/4	15/16	1 5/16	1 11/16	2 1/16
13/32	19/32	25/32	1	1 3/8	1 3/4	2 3/8
7/16	5/8	13/16	1 1/16	1 7/16	1 13/16	

We endeavor to carry a full range of sizes in stock for immediate shipment.

MERCHANT BAR IRON

ROUNDS

Diameter, Inches	Length in Feet	Average Stock Lineal Feet	Diameter, Inches	Length in Feet	Average Stock Lineal Feet
3/8	14 and 16	1700	1 1/8	14 and 16	12000
1/2	14 and 16	2800	1 1/4	14 and 16	13000
5/8	14 and 16	7600	1 3/8	14 and 16	3500
3/4	14 and 16	7600	1 1/2	14 and 16	3000
7/8	14 and 16	10000	1 3/4	14 and 16	4000
1	14 and 16	16000	2	14 and 16	1500

SQUARES

Diameter, Inches	Length in Feet	Average Stock Lineal Feet	Diameter, Inches	Length in Feet	Average Stock Lineal Feet
3/8	14 and 16	4000	1 1/8	14 and 18	6000
1/2	14 and 16	4000	1 1/4	14 and 16	1200
5/8	14 and 16	5500	1 1/2	14 and 16	900
3/4	14 and 18	13000	1 3/4	14 and 16	600
7/8	14 and 18	16500	2	14 and 16	350
1	14 and 18	7000			

FLATS

Lengths, 14 and 16 Feet.

Size	Average Stock Lineal Feet	Size	Average Stock Lineal Feet	Size	Average Stock Lineal Feet
1-4×1	4250	3-8×2	3000	3-4×1 1/2	2800
×1 1/4	4000	×2 1/2	2800	×2	3000
×1 1/2	8750	×3	2800	×2 1/2	1500
×1 3/4	7000	×3 1/2	2700	×3	2200
×2	8000	×4	1500	×3 1/2	1050
×2 1/2	10000	×4 1/2	700	×4	800
×3	9000	1-2×1 1/4	1600	×5	800
×3 1/2	5000	×1 1/2	2500	×5 1/2	650
×4	2800	×1 3/4	1800	×6	350
×5	900	×2	3000		
×6	600	×2 1/2	2750	7-8×1 1/2	1600
		×3	2000	×1 3/4	2500
5-16×1	4000	×3 1/2	1800	×2	2000
×1 1/4	5000	×4	1500	×2 1/2	800
×1 1/2	9000	×5	1500		
×2	2500	×6	450	1×1 1/2	500
×2 1/2	1800	5-8×1 1/4	1000	×1 3/4	450
×3	1000	×1 1/2	6000	×2	1400
×3 1/2	1000	×1 3/4	3200	×2 1/2	1500
×4	400	×2	1850	×3	900
×5	400	×2 1/2	2000	×3 1/2	1300
		×3	1800	×4	1200
3-8×1 1/4	5000	×3 1/2	1800	×5	200
×1 1/2	3500	×4	1600	×6	250
×1 3/4	2200			Continued	

GENUINE SWEDISH OR NORWAY IRON

ROUNDS

3/16	7/16	3/4	1 1/4	1 3/4	2 3/4
1/4	1/2	7/8	1 3/8	2	3
5/16	9/16	1	1 1/2	2 1/4	3 1/2
3/8	5/8	1 1/8	1 5/8	2 1/2	4

SQUARES

1/4	1/2	7/8	1 3/8	2	3
5/16	9/16	1	1 1/2	2 1/4	3 1/2
3/8	5/8	1 1/8	1 5/8	2 1/2	4
7/16	3/4	1 1/4	1 3/4	2 3/4	

FLATS

3-16× 3/8	5-16× 5/8	3-8×1 1/2	1-2×2 1/2	5-8×3 1/2	7-8×1
× 3/4	× 3/4	×1 3/4	×2 3/4	×4	×1 1/8
× 7/8	× 7/8	×2	×3	×4 1/2	×1 1/4
×1	×1	×2 1/4	×3 1/2	×5	×1 1/2
	×1 1/8	×2 1/2	×4	×6	×1 3/4
1-4× 1/2	×1 1/4	×2 3/4	×4 1/2		×2
× 5/8	×1 1/2	×3	×5	3-4×1	×2 1/4
× 3/4	×1 3/4	×3 1/2	×6	×1 1/8	×2 1/2
× 7/8	×2	×4		×1 1/4	×3
×1	×2 1/4	×5	5-8× 3/4	×1 1/2	×3 1/2
×1 1/8	×2 1/2	×6	× 7/8	×1 3/4	×4
×1 1/4	×3		×1	×2	
×1 1/2		1-2× 3/4	×1 1/8	×2 1/4	1×1 1/2
×1 3/4	3-8× 1/2	× 7/8	×1 1/4	×2 1/2	×1 3/4
×2	× 5/8	×1	×1 1/2	×2 3/4	×2
×2 1/4	× 3/4	×1 1/8	×1 3/4	×3	×2 1/2
×2 1/2	× 7/8	×1 1/4	×2	×3 1/2	×3
×3	×1	×1 1/2	×2 1/4	×4	×3 1/2
×4	×1 1/8	×1 3/4	×2 1/2	×4 1/2	×4
	×1 1/4	×2	×2 3/4	×5	×5
5-16× 1/2	×1 3/8	×2 1/4	×3	×6	

The above stock is carried in random lengths which range from 10 to 16 feet. If certain lengths are ordered we will try to select bars in lengths as specified, but can not guarantee to ship exact lengths.

Classification, see section 8.

STEEL TIRE

ROUND EDGE. MEASURED ON THE FLAT

Size	Lengths
3/16× 3/4	12′ and 13′ 6″
3/16× 7/8	12′ and 13′ 6″
3/16×1	12′ and 13′ 6″
1/4× 3/4	12′ and 13′ 6″
1/4× 7/8	12′ and 13′ 6″
1/4×1	12′ and 13′ 6″
5/16× 7/8	12′ and 13′ 6″
5/16×1	12′ and 13′ 6″
5/16×1 1/8	12′ and 13′ 6″
5/16×1 1/4	12′ and 13′ 6″
5/16×3 1/2	10′, 12′ and 15′
3/8×1	12′ 6″ and 13′ 6″
3/8×1 1/8	12′ 6″ and 13′ 6″
3/8×1 1/4	12′ 6″ and 13′ 6″
3/8×1 3/8	12′ 6″ and 13′ 6″
3/8×1 1/2	12′ and 15′
3/8×1 3/4	12′ and 15′
3/8×2	12′ and 15′
3/8×2 1/2	10′, 12′ and 15′
3/8×3	10′, 12′ and 15′
3/8×3 1/2	10′, 12′ and 15′
3/8×4	10′, 12′ and 15′
7/16×1 1/4	12′ 6″ and 13′ 6″
7/16×1 3/8	12′ 6″ and 13′ 6″
7/16×1 1/2	12′ 6″ and 13′ 6″
7/16×2	12′ and 15′
7/16×3	10′, 12′ and 15′
1/2×1 1/4	12′ and 15′
1/2×1 1/2	10′ 6″, 11′ 8″, 13′ 6″ and 14′ 8″
1/2×1 5/8	10′ 6″, 11′ 8″, 13′ 6″ and 14′ 8″
1/2×1 3/4	10′ 6″, 11′ 8″, 13′ 6″ and 14′ 8″
1/2×2	10′ 6″, 11′ 8″, 13′ 6″ and 14′ 8″
1/2×2 1/4	12′ and 15′
1/2×2 1/2	10′, 10′ 6″, 12′ and 15′
1/2×3	10′, 12′ and 15′
1/2×3 1/2	10′, 12′ and 15′
1/2×4	10′, 12′ and 15′
9/16×1 5/8	11′ 8″, 13′ 6″ and 14′ 8″
9/16×1 3/4	10′ 6″, 11′ 8″, 13′ 6″ and 14′ 8″
9/16×2	10′ 6″, 11′ 8″, 13′ 6″ and 14′ 8″
5/8×1 1/2	12′ and 15′
5/8×1 5/8	10′, 6″ 11′ 8″, 13′ 6″ and 14′ 8″
5/8×1 3/4	10′ 6″, 11′ 8″, 13′ 6″ and 14′ 8″
5/8×2	10′ 6″, 11′ 8″, 13′ 6″ and 14′ 8″
5/8×2 1/4	10′ 6″, 11′ 8″ and 14′ 8″
5/8×2 1/2	11′ 8″, 14′ 8″
5/8×3	10′ 6″, 11′ 8″ and 14′ 8″
5/8×3 1/2	10′ 6″, 12′ and 15′
5/8×4	12′ and 15′
3/4×1 1/2	10′ 6″, 12′ and 15′
3/4×1 3/4	10′ 6″, 11′ 8″, 13′ 6″ and 14′ 8″
3/4×2	10′ 6″, 11′ 8″, 13′ 6″ and 14′ 8″
3/4×2 1/4	10′ 6″, 11′ 8″, 13′ 6″ and 13′ 8″
3/4×2 1/2	10′ 6″, 11′ 8″ and 14′ 8″
3/4×2 3/4	10′ 6″, 12′ and 15′
3/4×3	10′ 6″, 11′ 8″ and 14′ 8″
3/4×3 1/2	10′ 6″, 11′ 8″ and 14′ 8″
3/4×4	10′ 6″, 11′ 8″ and 14′ 8″
7/8×2	12′ and 15′
7/8×2 1/2	10′ 6″, 12′ and 15′
7/8×2 3/4	10′ 6″, 11′ 8″ and 14′ 8″
7/8×3	10′ 6″, 11′ 8″ and 14′ 8″
7/8×3 1/2	10′ 6″, 11′ 8″ and 14′ 8″
7/8×4	10′ 6″, 11′ 8″ and 14′ 8″
1 ×2 1/2	10′ 6″, 12′ and 15′
1 ×2 3/4	10′ 6″, 12′ and 15′
1 ×3	10′ 6″, 12′ and 15′
1 ×4	10′ 6″, 12′ and 15′

ICE SLIDE STEEL

$1\frac{1}{2} \times \frac{3}{16}$ ..... 12, 14, 16 foot lengths

CONCAVE—CONVEX SLED SHOE STEEL

2 × $\frac{3}{8}$	16 feet	4 × $\frac{3}{8}$	9 feet
$2\frac{1}{4} \times \frac{3}{8}$	16 "	$3\frac{1}{2} \times \frac{1}{2}$	9 "
$2\frac{1}{2} \times \frac{3}{8}$	16 "	$3\frac{1}{2} \times \frac{1}{2}$	16 "
3 × $\frac{3}{8}$	16 "	4 × $\frac{1}{2}$	9 "
$3\frac{1}{2} \times \frac{3}{8}$	16 "		

Ends are forged concave—convex.

RUBBER TIRE CHANNELS

Size, Inch	Estimated Weight per Foot	Length
$\frac{3}{4}$	.51	11′ and 12′
$\frac{7}{8}$	.68	11′ and 12′
1	.78	11′ and 12′
$1\frac{1}{8}$	.99	11′ and 12′
$1\frac{1}{4}$	1.19	11′ 6″ and 12′ 6″

SCREEN BARS

$2\frac{1}{4} \times 1 \times \frac{5}{16}$ ..... 16 foot lengths

3.53 pounds per foot

SCREEN BARS DOUBLE BEVEL

$4 \times \frac{5}{16}$ ..... 54, 60 foot lengths

3.61 pounds per foot

PACKER'S CARRIER TRACK

$2\frac{1}{2} \times \frac{1}{2}$ (overall) ..... 16 foot lengths

RAILROAD PRACTICE WITH ULSTER AND ULSTER SPECIAL IRON

"Ulster" is one of the oldest brands of iron made in the United States and its superior qualities have long been acknowledged. It is celebrated for its solidity, toughness, strength and reliable uniformity and is used quite generally where these qualities are sought as a first consideration.

The merits of "Ulster" are so well known and appreciated in the shops of the prominent railroads, engine builders, boilermakers and machinists throughout the country, that it is hardly necessary to comment on its peculiar qualities. It is considered the most reliable iron made and to run more uniform in texture and physical characteristics than any other iron manufactured to meet the same shop conditions.

"Ulster" iron will stand nearly its tensile strength before stretching — certainly a wonderful proof of tenacity and toughness of fiber. Ductility is not sacrificed to excessive tensile strength, nor is the solidity or strength of the iron sacrificed to excessive softness or ease in mechanical working.

"Ulster" is an iron in which all the essentials constituting a reliable iron for exacting purposes, are considered and maintained in as large proportions as possible. Too high tensile strength involves loss of proper ductility, and causes a hard and brittle iron — on the other hand, too great ductility and softness involves a lack of solidity and wearing qualities. The retention of sufficient quantities of the oxide in the finished iron results from a phase of the manufacture that gives "Ulster" iron its characteristic toughness and lasting qualities, and particularly differentiates it from other irons.

The reputation of "Ulster" and "Ulster Special" iron is secure, founded as it is on the always dependable and consistent care that is taken in procuring that superior and particular grade of material which is exclusively used in its manufacture.

We have had full knowledge of "Ulster" iron for over seventy years and we do not hesitate to offer it as the best and most carefully made iron that is produced for staybolt and engine bolt purposes. It is a hand-made and hand-inspected iron, produced on the basis of quality rather than tonnage and its continued use and standardization by a great majority of the leading railroads is perhaps the best evidence of its quality.

JOSEPH T. RYERSON & SON. CHICAGO, ILL.	ULSTER

"Ulster" engine bolt iron is a high grade piled iron manufactured expressly for engine bolts and other purposes where a high grade iron is required. Like "Ulster Special" staybolt iron a special grade of pig iron made from a selected ore is used and no scrap whatever enters into its manufacture. In the manufacture of "Ulster" engine bolt iron a puddled iron, free from all trace of steel, is squeezed, properly worked, then rolled into the slab, after which it is cut up in short lengths, piled and rerolled. A most careful selection of the materials insures the same solidity, toughness, strength and uniform characteristics that have made the superior qualities of "Ulster" iron generally recognized.

"Ulster" engine bolt iron is a close grained and readily turned material. It, like "Ulster" staybolt iron, is particularly characterized by its toughness and excellent lasting qualities. This is largely due to a method of manufacture which insures the retention of sufficient amounts of the oxide to give the iron a fibrous structure and toughness that is not found in other irons.

"Ulster" engine bolt iron, tested in the original section, will show a minimum tensile strength of not less than 48,000 pounds. A considerable proportion of "Ulster" iron is furnished, however, on specifications that require a minimum tensile strength of not less than 50,000 pounds per square inch. Bars of this iron, when nicked evenly and bent back, will show a long, silky fiber free from slag or seams and otherwise will meet the specifications adopted by the American Society for Testing Materials. Care is exercised in the manufacture of this iron to see that it is free from hot shortness; that it will stand heading, take a good thread with the dies in fair working order and that it is not sufficiently ductile to permit stretching under service conditions or when bolts are being drawn up into place.

"Ulster" engine bolt iron is now being used by a large proportion of the leading systems and enjoys a reputation for strength, toughness and uniformity wherever such material is used or understood.

We are in position to furnish "Ulster" engine bolt iron to special specifications for unusual requirements, when desired.

JOSEPH T. RYERSON & SON. CHICAGO, ILL.	ULSTER SPECIAL

"Ulster Special" is the highest grade of iron made for staybolt purposes. It is a special hand-made iron manufactured solely with the idea of producing a high grade and uniformly dependable iron for locomotive staybolts.

No scrap whatever enters into the making of this iron from the puddle ball to the completed product. A special grade of pig made from a selected New Jersey Magnetic Ore and a high grade charcoal iron are the only materials used. The careful working, handling and inspection of this iron from the first process to its completion, insures a staybolt iron that is free from seams, cinder pockets, scabs or other imperfections that are frequently found in staybolt irons.

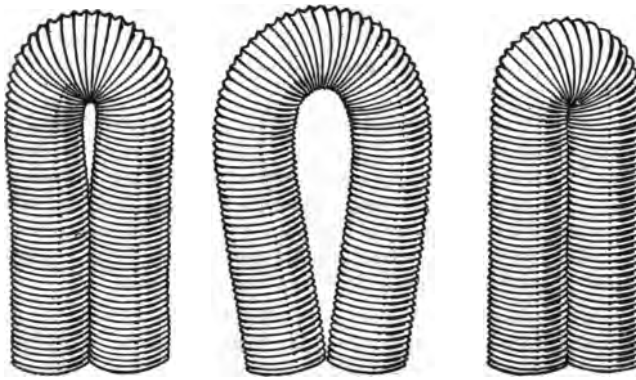
"Ulster Special" staybolt iron is a piled and twice rerolled iron. The ends of the bars in each rolling are sheared off to insure absence of cinder pockets and seams; and these crop ends so sheared off are not used in the pile. In construction, the finished iron has a full, coarse fiber which is noted for its toughness. Its tensile strength is as high as is compatible with this grade of material, none of it being less than 48,000 pounds per square inch and a considerable proportion of the output being furnished on specifications requiring 50,000 pounds per square inch tensile strength as a minimum.

In producing an iron of this character, however, ductility is not sacrificed to extreme strength and hardness, in evidence of which we call attention to a minimum elongation of 28 per cent, while a large proportion of "Ulster Special" staybolt iron manufactured is made to specifications requiring 30 per cent elongation as a minimum and with an elastic limit fully 70 per cent of the ultimate tensile strength. In staybolt sizes up to 1¼ inches round, we have no difficulty in obtaining a minimum elastic limit of 35,000 pounds when tested in the original section.

"Ulster Special" will stand bending double on itself without showing fracture or flaw. It will take a clear sharp thread; can be easily worked and will meet the highest vibratory requirements.

"Ulster Special" is acknowledged to be the highest grade of staybolt iron made. It is conceded as being far superior to the best imported brands and it is now used as the standard staybolt iron by the leading railroads of the United States.

ULSTER IRON



"Ulster Special" staybolt iron is manufactured particularly for staybolt purposes and to meet the service conditions encountered in high pressure locomotive boilers. The increased steam pressures which are now dealt with in the modern locomotive boilers have brought about a demand for the highest grade material that can be purchased for staybolt purposes and the very general use of "Ulster Special" iron by the leading railroad systems, bears witness to the success which has attended its use.

"Ulster Special" staybolt iron shows a clean fibrous fracture entirely free from steel. It will cold bend on itself without fracture or flaw and when threaded may be bent around a pin or mandrel of same diameter without fracture.

"Ulster Special" staybolt iron will take a clean, sharp thread with the dies in fair working order and otherwise will meet the most rigid specifications imposed.

"Ulster" iron can be made to special specification in regard to tensile strength, elongation, etc., if desired.

JOSEPH T. RYERSON & SON
CHICAGO, ILL.

NYKROME

RAILROAD PRACTICE

Greater and harder service is expected of locomotives each year, and engine failures involve more serious consequences as trains grow heavier and service more severe. To eliminate engine failures, due to the breakage of material in the running gear, is the object of "Nykrome" steel.

"Nykrome" is a special alloy steel of great strength, toughness and elasticity. It contains the elements nickel and chromium in sufficient quantities to obtain the maximum advantages of heat treatment to give high tensile strength, also high elastic limit and toughness. With "Nykrome" it is possible to attain higher physical qualities than are possible with carbon steels and yet avoid the disadvantages of other heat-treated alloy steels.

"Nykrome" is a strictly homogenous metal, free from seams, pipes and the segregation which is so frequently found in alloy materials. "Nykrome" steel is forged and machined as readily as carbon steel, requiring no special precautions, skill or training.

"Nykrome" is recommended particularly for axles, crank pins, side rods, main rods, piston rods, valve motion parts, locomotive spring hangers, also for bolts and keys. It takes a remarkably deep case-hardening, hence is particulary well adapted for valve motion pins and other similar parts.

"Nykrome" is also particularly adapted for use in such places where it is difficult or impossible to increase the sizes of parts and yet where engine failures result from the continual breakage of those parts.

As an example of the average physical characteristics of this material, we give below the physical properties of a standard test specimen. Material can be furnished to special specification when desired, the characteristics given below merely representing a specification to which considerable quantities of material are now supplied.

Tensile strength	125,000 pounds per square inch
Elastic Limit	100,000 pounds per square inch
Elongation	20 per cent in two inches
Reduction of area	50 per cent in two inches

MEMORANDA

DATE	ITEMS	PRICE	

2—SHAPES AND PLATES

THE shape and plate section contains a complete range of structural shapes, standard grades of plate, and rails—with large quantities of all sizes on hand for immediate shipment.

Our warehouses for these lines are proportionate in size and handling arrangement to the immense tonnage listed. They comprise eight acres of floor space, track facilities for loading twenty-two cars at once, with material cut on three high speed friction saws or three heavy duty shears, served by eight electric bridge traveling cranes.

In advantage to the user this means—storage under roof; ability to carry and furnish extreme lengths in both shapes and plates; ability to cut long stock to specified lengths without extra charge; ability to do special width and length cutting at reasonable extras.

This section contains only descriptions and lists of material. Prices are given in Section 8, Weights in Section 9, and Data on the use of materials in Sections 10, 11 and 12.

2—SHAPES AND PLATES

	Page
STRUCTURAL SHAPES	
[illegible].....	201
[illegible]s.....	202
[illegible]els, Small.....	202
Angles, Equal Leg.....	203
Angles, Unequal Leg.....	205
Angles, Galvanized.....	206
Tees.....	207
PLATES	
Flat Circles, Flange and Tank Steel.....	208
Heads, Machine Flanged....	209
Heads, Dished and Flanged..	209
Plates, Universal Rolled.....	210
Plates, Tank Steel.....	212
Plates, American Ingot Iron Tank.....	214
Plates, Tank Steel Sheared...	215
Plates for Standard Boilers...	216
Plates, Flange Steel.....	218
Plates, Hartford Fire Box Steel.....	219
"Firmtread" Steel Floor Plates.....	220
"Firmtread" Stair Treads....	221
Rails.....	222

ASSOCIATED SUBJECTS

	Section
Structural, Boiler and Tank Rivets.....	§ 5
Fitting Up Bolts.....	§ 5
Perforated Plates.....	§ 6
Price Classification, Extras...	§ 8
Cutting Extras.....	§ 8
Standard Specifications.....	§ 8
Hartford Specifications.....	§ 8
Flanging and Dishing Extras	§ 8
Flue Hole Extras.....	§ 8
Weight of Shapes and Plates..	§ 9
Properties of Structurals	§11
Safe Loads, Structurals	§11
Safe Loads, Built-up.....	§11
Safe Loads, Columns.....	§11
Standard Connections.....	§11
Standard Separators.....	§11
Joist Hangers and Tie Straps..	§11
Data on Cast Iron Columns.	§11
Safe Loads, Floor Plates....	§11
Properties of Special Structurals.....	§11
Cranes, Rails, Clearances, etc.	§11
Shearing and Bearing Value, Rivets.....	§12
Riveted Joints.....	§12
Boiler Head Lay Outs.....	§12
Gallons in Cylindrical Tanks.	§12
Data on Standpipes.....	§12

Complete Alphabetical Index will be found on last four pages of the book.

STRUCTURAL SHAPES

These structural shapes are of O. H. Steel and meet Manufacturers' Standard Specifications for structural steel, with a tensile strength of 60,000 to 70,000 lbs. per square inch, and are recommended for building, bridge and general structural work.

"I" BEAMS

Size, Depth in Inches	Weight per Foot in Pounds	Lineal Feet, Average Stock	Size, Depth in Inches	Weight per Foot in Pounds	Lineal Feet, Average Stock
3	5½	16000	10	35	6800
	7½	9600		40	3000
4	7½	14000	12	31½	16000
	9½	3000		35	2400
	10½	2000		40	4200
				45	2300
5	9¾	19500		50	1900
	12¼	2000		55	2600
	14¾	5400			
			15	42	16000
6	12¼	33000		50	1000
	14¾	1000		55	2000
	17¼	4200		60	3200
7	15	9000		70	1300
	17½	1000		80	2000
	20	2400		100	1800
8	18	30000	18	55	12000
	20½	1800		65	2400
	23	5500		70	1000
	25½	2800		75	2500
				90	2750
9	21	18000			
	25	3600	20	65	6100
	30	1800		80	3200
	35	3600		100	1000
10	25	18000	24	80	4200
	30	3600		100	1300

Length of 3 and 4 inch beams, 3 to 50 feet; 5 to 12 inch, inclusive, 3 to 60 feet; 15 to 24 inch, inclusive, 3 to 65 feet.

STEEL CHANNELS

Size, Depth in Inches	Weight per Foot in Pounds	Lineal Feet, Average Stock	Size, Depth in Inches	Weight per Foot in Pounds	Lineal Feet, Average Stock
3	4	18000	9	13¼	9600
	6	7200		15	1000
4	5¼	34000		20	1000
	6¼	3000		25	1300
	7¼	3600	10	15	9800
5	6½	26700		20	4200
	9	1800		25	2400
	11½	6000		30	1800
6	8	28000		35	3000
	10½	3900	12	20½	4800
	13	3400		25	1200
	15½	2900		30	3300
7	9¾	14500		35	3000
	12¼	4200		40	2200
	14¾	3800	13	32	1000
	17¼	1000	15	33	5100
	19¾	3600		35	2000
8	11¼	22000		40	1100
	13¾	11000		45	1000
	16¼	8400		50	1200
	18¾	2400		55	1000
	21¼	4800			

Length of 3 and 4 inch channels, 3 to 50 feet; other sizes, 3 to 60 feet.

SMALL STEEL CHANNELS

Size	Weight per Foot in Pounds	Lineal Feet, Average Stock	Size	Weight per Foot in Pounds	Lineal Feet, Average Stock
½×¼×⅛*	.28	40000	1½× ½×⅛	1.12	30000
⅝×$\frac{5}{16}$×⅛	.41	85000	1½× ½×¼	1.53	14000
¾×⅜×$\frac{7}{16}$	.52	100000	1½× $\frac{9}{16}$×¼	1.68	20000
¾×⅜×⅛	.56	182000	1½× ¾×⅛	1.17	20000
⅞×$\frac{7}{16}$×⅛	.69	87000	1½×1½×$\frac{3}{16}$	2.63	172000
1 ×⅝×⅛	.68	40000	2 × $\frac{9}{16}$×$\frac{3}{16}$	1.90	10100
1 ×½×⅛	.83	57000	2 × ⅝×¼	2.18	47000
1⅛×$\frac{9}{16}$×$\frac{3}{16}$	1.16	96000	2 ×1 ×$\frac{3}{16}$	2.40	57000
1¼×½×⅛	1.01	14000	2½×⅝ ×$\frac{3}{16}$	2.27	37000

Lengths 20 and 25 feet. Can furnish other sizes promptly from mill. *20 feet only.

EQUAL LEG STEEL ANGLES

BAR SIZES—MILD STEEL

Sizes	Weight per Foot in Pounds	Stock Length in Feet	Lineal Feet, Average Stock
1/2× 1/2×1/8	0.38	20 and 22	65000
5/8× 5/8×1/8	0.48	20 and 22	66000
3/4× 3/4×1/8	0.59	20 and 22	220000
7/8× 7/8×1/8	0.7	20 and 22	110000
1 ×1 ×1/8	0.8	20 and 22	240000
1 ×1 ×3/16	1.16	20 and 22	90000
1 ×1 ×1/4	1.49	20 and 22	65000
1 1/4×1 1/4×1/8	1.01	20 and 22	107000
1 1/4×1 1/4×3/16	1.48	20 and 22	142000
1 1/4×1 1/4×1/4	1.92	20 and 22	37000
1 1/2×1 1/2×1/8	1.23	20 and 22	150000
1 1/2×1 1/2×3/16	1.8	20 and 22	180000
1 1/2×1 1/2×1/4	2.34	20 and 22	82000
1 1/2×1 1/2×5/16	2.86	20 and 22	70000
1 1/2×1 1/2×3/8	3.35	20 and 22	90000
1 3/4×1 3/4×1/8	1.44	20 and 22	60000
1 3/4×1 3/4×3/16	2.12	20 and 22	52000
1 3/4×1 3/4×1/4	2.77	20 and 22	25000
1 3/4×1 3/4×5/16	3.39	20 and 22	36000
2 ×2 ×1/8	1.65	20 and 22	56000
2 ×2 ×3/16	2.44	20, 22, 30 and 40	95000
2 ×2 ×1/4	3.19	20, 22, 30 and 40	240000
2 ×2 ×5/16	3.92	20, 22, 30 and 40	86000
2 ×2 ×3/8	4.7	20, 22, 30 and 40	17000
2 1/4×2 1/4×1/8	1.86	20 and 22	36000
2 1/4×2 1/4×3/16	2.75	20 and 40	39000
2 1/4×2 1/4×1/4	3.62	20, 22, 30 and 40	38000
2 1/4×2 1/4×5/16	4.5	20, 22, 30 and 40	13000
2 1/2×2 1/2×1/8	2.08	20 and 22	57000
2 1/2×2 1/2×3/16	3.07	20, 22, 30 and 40	57000
2 1/2×2 1/2×1/4	4.1	20, 22, 30 and 40	136000
2 1/2×2 1/2×5/16	5.0	20, 22, 30 and 40	104000
2 1/2×2 1/2×3/8	5.9	20, 22, 30 and 40	72000

EQUAL LEG STEEL ANGLES
CONTINUED

O. H. STRUCTURAL—MANUFACTURERS' STANDARD

Sizes	Weight per Foot in Pounds	Stock Length in Feet	Lineal Feet, Average Stock
*3 ×3 ×1/8	2.5	20	2500
*3 ×3 ×3/16	3.71	20	61000
3 ×3 ×1/4	4.9	3 to 60	12100
3 ×3 ×5/16	6.1	3 to 60	14000
3 ×3 ×3/8	7.2	3 to 60	18000
3 ×3 ×7/16	8.3	3 to 60	3700
3 ×3 ×1/2	9.4	3 to 60	14600
3 ×3 ×5/8	11.5	3 to 50	11500
3 1/2×3 1/2×1/4	5.8	3 to 60	11800
3 1/2×3 1/2×5/16	7.2	3 to 60	3000
3 1/2×3 1/2×3/8	8.5	3 to 60	5500
3 1/2×3 1/2×7/16	9.8	3 to 60	4200
3 1/2×3 1/2×1/2	11.1	3 to 60	4800
3 1/2×3 1/2×5/8	13.6	3 to 60	2500
4 ×4 ×1/4	6.6	3 to 60	5000
4 ×4 ×5/16	8.2	3 to 60	19000
4 ×4 ×3/8	9.8	3 to 60	3600
4 ×4 ×7/16	11.3	3 to 60	6600
4 ×4 ×1/2	12.8	3 to 60	9000
4 ×4 ×5/8	15.7	3 to 60	8400
4 ×4 ×3/4	18.5	3 to 60	8500
5 ×5 ×3/8	12.3	3 to 60	1000
5 ×5 ×1/2	16.2	3 to 60	3000
5 ×5 ×5/8	20.0	3 to 60	3500
6 ×6 ×3/8	14.9	3 to 60	5400
6 ×6 ×7/16	17.2	3 to 60	3600
6 ×6 ×1/2	19.6	3 to 60	7600
6 ×6 ×9/16	21.9	3 to 60	3500
6 ×6 ×5/8	24.2	3 to 60	7800
6 ×6 ×3/4	28.7	3 to 60	6100
6 ×6 ×7/8	33.1	3 to 60	6700
8 ×8 ×1/2	26.4	3 to 60	1900
8 ×8 ×3/4	38.9	3 to 60	3000
8 ×8 ×7/8	45.0	3 to 60	1000

*Bar sizes—Mild Steel.

UNEQUAL LEG STEEL ANGLES

O. H. STRUCTURAL—MANUFACTURERS' STANDARD

BAR SIZES—MILD STEEL

Sizes	Weight per Foot in Pounds	Stock Length in Feet	Lineal Feet, Average Stock
1 × 5/8×1/8	0.64	20 and 22	85000
1 3/8× 7/8×1/8	0.91	20 and 22	17500
2 ×1 1/2×1/8	1.44	20 and 22	10000
2 ×1 1/2×3/16	2.12	20, 22, 30 and 40	120000
2 ×1 1/2×1/4	2.77	20, 22 and 30	38000
2 1/2×2 ×3/16	2.75	20, 22, 30 and 40	65700
2 1/2×2 ×1/4	3.62	20, 22, 30 and 40	39000
2 1/2×2 ×5/16	4.5	20, 22, 30 and 40	46000
2 1/2×2 ×5/8	5.3	3 to 40	22000
*3 ×2 ×3/16	3.07	3 to 60	32000
3 ×2 ×1/4	4.1	3 to 60	33000
3 ×2 ×5/16	5.0	3 to 60	7800
3 ×2 ×5/8	5.9	3 to 60	10800
3 ×2 1/2×1/4	4.5	3 to 60	42000
3 ×2 1/2×5/16	5.6	3 to 60	12000
3 ×2 1/2×5/8	6.6	3 to 60	3600
3 1/2×2 1/2×1/4	4.9	3 to 60	25000
3 1/2×2 1/2×5/16	6.1	3 to 60	8000
3 1/2×2 1/2×3/8	7.2	3 to 60	6000
3 1/2×2 1/2×1/2	9.4	3 to 60	1000
3 1/2×2 1/2×5/8	11.5	3 to 60	1100
3 1/2×3 ×5/16	6.6	3 to 60	18000
3 1/2×3 ×3/8	7.9	3 to 60	3000
3 1/2×3 ×1/2	10.2	3 to 60	1000
4 ×3 ×5/16	7.2	3 to 60	24000
4 ×3 ×3/8	8.5	3 to 60	17000
4 ×3 ×7/16	9.8	3 to 60	2400
4 ×3 ×1/2	11.1	3 to 60	5400
4 ×3 1/2×3/8	9.1	3 to 60	6600
4 1/2×3 ×3/8	9.1	3 to 60	3500
5 ×3 ×5/16	8.2	3 to 60	9300
5 ×3 ×3/8	9.8	3 to 60	11000
5 ×3 ×1/2	12.8	3 to 60	4200

*This and smaller are Bar sizes.

UNEQUAL LEG STEEL ANGLES
CONTINUED

O. H. STRUCTURAL—MANUFACTURERS' STANDARD

Sizes	Weight per Foot in Pounds	Stock Length in Feet	Lineal Feet, Average Stock
5 ×3½×5/16	8.7	3 to 60	8400
5 ×3½×3/8	10.4	3 to 60	9000
5 ×3½×7/16	12.0	3 to 60	1800
5 ×3½×½	13.6	3 to 60	6800
5 ×3½×5/8	16.8	3 to 60	2700
5 ×4 ×3/8	11.0	3 to 60	6000
6 ×3½×3/8	11.7	3 to 60	3000
6 ×3½×7/16	13.5	3 to 60	3000
6 ×3½×½	15.3	3 to 60	4200
6 ×3½×9/16	17.1	3 to 60	2200
6 ×3½×5/8	18.9	3 to 60	4400
6 ×4 ×3/8	12.3	3 to 60	19000
6 ×4 ×5/16	14.3	3 to 60	6000
6 ×4 ×½	16.2	3 to 60	9700
6 ×4 ×7/16	18.1	3 to 60	3000
6 ×4 ×5/8	20.0	3 to 60	14200
6 ×4 ×¾	23.6	3 to 60	3600
7 ×3½×½	17.0	3 to 60	5400
8 ×6 ×¾	33.8	3 to 60	1800

GALVANIZED ANGLES

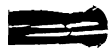
Sizes	Stock Lengths, Feet	Lineal Feet, Average Stock	Sizes	Stock Lengths, Feet	Lineal Feet, Average Stock
¾×¾×⅛	20 and 22	17940	1¼×1¼×3/16	20 and 22	4940
1 ×1 ×⅛	20 and 22	45100	1½×1½×3/16	20 and 22	4640
1¼×1¼×⅛	20 and 22	59960	1¾×1¾×3/16	20 and 22	8640
1½×1½×⅛	20 and 22	7080	2 ×2 ×3/16	20 and 22	1520
2 ×2 ×⅛	20 and 22	8300	2½×2½×3/16	20 and 22	1980
2½×2½×⅛	20 and 22	3500	1½×1½×¼	20 and 22	4200
1 ×1 ×3/16	20 and 22	8440	2 ×2 ×¼	20 and 22	1440

STEEL TEES

O. H. STRUCTURAL—MANUFACTURERS' STANDARD

BAR SIZES—MILD STEEL

Sizes	Weight per Foot in Pounds	Stock Length in Feet	Lineal Feet, Average Stock
3/4 × 3/4 × 1/8	0.61	20	19000
7/8 × 7/8 × 1/8	0.73	20	5000
1 × 1 × 1/8	0.89	20 and 25	120000
1 × 1 × 3/16	1.25	20 and 25	5000
1 1/8 × 1 1/8 × 3/16	1.37	20 and 25	4000
1 1/4 × 1 1/4 × 3/16	1.55	20 and 25	93000
1 1/4 × 1 1/4 × 1/4	1.98	20 and 25	4000
1 1/2 × 1 1/2 × 3/16	1.90	20 and 25	39000
1 1/2 × 1 1/2 × 1/4	2.47	20 and 25	4000
1 3/4 × 1 3/4 × 3/16	2.26	20 and 25	6000
1 3/4 × 1 3/4 × 1/4	3.09	20 and 25	10000
2 × 1 1/2 × 1/4	3.09	20 and 30	15000
2 × 2 × 1/4	3.56	20, 25, 30 and 40	31000
2 × 2 × 5/16	4.3	20, 25, 30 and 40	9000
2 1/4 × 2 1/4 × 1/4	4.1	20, 25, 30 and 40	21000
2 1/2 × 2 1/2 × 5/16	5.5	20, 25, 30 and 40	20000
*2 1/2 × 2 1/2 × 3/8	6.4	20, 25, 30 and 40	1000
2 1/2 × 3 × 5/16	6.1	3 to 50	1000
3 × 2 1/2 × 5/16	6.1	3 to 50	5000
3 × 3 × 5/16	6.7	3 to 50	5500
3 × 3 × 3/8	7.8	3 to 50	3100
3 × 3 × 7/16	8.9	3 to 50	5000
3 × 3 1/2 × 3/8	8.5	3 to 50	1500
3 1/2 × 3 × 3/8	8.5	3 to 50	11000
3 1/2 × 3 1/2 × 3/8	9.2	3 to 50	5200
3 1/2 × 3 1/2 × 1/2	11.7	3 to 50	4300
3 1/2 × 4 × 3/8	9.8	3 to 50	4000
4 × 3 × 3/8	9.2	3 to 50	5000
4 × 4 × 3/8	10.5	3 to 50	5400
4 × 4 × 1/2	13.5	3 to 50	3000
4 × 5 × 3/8	11.9	3 to 50	3000
4 × 5 × 1/2	15.3	3 to 50	1000
4 1/2 × 2 1/2 × 3/8	9.2	3 to 50	5000
4 1/2 × 3 1/2 × 7/16	15.7	3 to 50	3000



*This and smaller are Bar sizes.

FLANGE AND TANK STEEL FLAT CIRCLES

Diam. in Inches	Thickness, Quality and Average Stock											
	1/8	1/4	1/8		3/8		1/2		1/2		5/8	
	Tank	Tank	Flange	Tank	Flange	Tank	Flange	Tank	Flange	Tank	Flange	Flange
16	....	....	60	....	10	....	....	....	....	....	....	....
18	....	....	80	....	50	20	....	....	....	....	....	....
20	....	25	80	15	15	30	....	....	....	....	....	....
22	....	60	90	10	15	15	....	....	....	....	....	....
24	30	25	15	35	20	25	....	....	....	....	....	....
26	20	10	30	20	30	40	....	....	....	....	....	....
28	40	50	25	20	10	25	....	....	....	....	....	....
30	55	30	25	10	25	35	....	....	....	....	....	....
32	50	20	15	20	30	30	....	....	....	....	....	....
34	45	50	20	20	15	10	10	....	15	....	....	....
36	90	25	35	20	15	10	10	....	10	....	....	....
38	20	20	5	15	25	20	20	....	20	....	....	....
40	40	45	30	30	25	15	10	....	20	....	....	....
42	50	25	35	15	25	50	15	....	10	....	....	....
44	95	15	10	15	20	20	15	....	15	....	....	....
46	25	60	45	15	35	20	10	....	15	....	....	....
48	5	10	15	20	10	10	5	....	10	15	....	....
52½	5	30	5	20	30	10	20	....	5	10	....	....
54	....	....	....	....	20	....	....	....	15	....	....	....
58½	30	30	....	15	5	5	20	....	5	20	....	....
60	....	....	....	....	10	....	25	....	30	....	....	....
65	10	15	....	20	....	....	....	....	....	....	....	....
66	....	....	....	....	20	15	15	....	10	15	....	5
71	....	5	....	10	....	....	5	....	....	....	....	....
72	....	....	....	....	20	10	5	....	5	5	....	10
77	....	5	....	5	....	....	20	....	....	....	....	....
78	....	....	....	....	25	15	20	....	15	20	....	15
81	....	....	....	....	....	....	....	....	10	....	....	....
87	....	....	....	....	....	....	....	....	10	....	....	....
89	....	10	....	10	15	5	....	....	....	....	....	....
91	....	....	....	....	....	....	....	....	10	....	....	....
96	....	10	....	....	....	....	....	....	....	....	....	....
97	....	....	....	....	....	....	....	....	5	....	....	....
101	....	15	....	5	5	15	....	....	....	....	....	....
103	....	....	....	....	10	5	....	....	10	....	....	....
120	....	10	....	....	....	....	....	....	....	....	....	....

Sizes 120 inches and larger furnished in two pieces.

MACHINE FLANGED HEADS

Thickness	Outside Diameter after Flanging in Inches											
	14	16	18	20	22	24	26	28	30	32	34	36
3/16	....	....	....	....	....	15	....	....	20	25	....	25
1/4	....	....	....	....	....	50	....	....	25	10	....	15
5/16	....	....	....	15	5	5	10	10	10	10	15	20
3/8	....	10	10	10	....	5	10	15	10	10	10	15
7/16	....	....	....	....	....	....	....	....	5	5	35	5
1/2	....	....	....	....	....	....	....	....	10	....	10	5
	38	40	42	44	46	48	50	54	60	66	72	
3/16	....	....	10	5	....	10	....	....	3	....	....	....
1/4	....	....	5	25	....	15	....	....	....	....	....	....
5/16	....	12	10	20	....	10	....	....	....	....	....	....
3/8	15	10	10	15	15	15	....	15	*5	....	....	....
7/16	20	....	15	....	....	5	....	10	*3	*5	....	....
1/2	10	10	5	5	10	15	....	5	*5	*10	*5	....

*Also with No. 2 Manhole. See Note below.

DISHED AND FLANGED TANK STEEL HEADS

Thickness	Outside Diameter after Flanging, Inches											
	24	26	28	30	32	34	36	38	40	42	44	48
3/16	15	50	....	10	....	25	15	5	15	75	5	65
1/4	5	15	....	15	10	10	5	40	....	5	5	15
3/8	....	....	....	....	....	....	....	....	....	....	....	....

Note.—Heads 3/16 inch and 1/4 inch in thickness are Tank Steel. All other sizes are Flange Steel. Figures in columns show the average amounts in stock.

Sizes other than those shown can be flanged, dished, or flanged and dished, from stock plates within a day or more, depending on size and quantity.

UNIVERSAL ROLLED PLATES

O. H. STEEL—MANUFACTURERS' STANDARD SPECIFICATIONS

60,000 TO 70,000 POUNDS TENSILE STRENGTH

Size	Weight per Lineal Foot	Average Stock Lineal Ft.	Size	Weight per Lineal Foot	Average Stock Lineal Ft.
3-16× 7	4.46	3500	5-16×28	29.76	600
× 8	5.10	2400	×30	31.88	500
× 9	5.74	3300			
×10	6.38	4000	3-8 × 7	8.93	2400
×12	7.65	1000	× 8	10.20	1500
×14	8.92	3000	× 9	11.48	2000
×15	9.56	4000	×10	12.75	1900
×16	10.20	2300	×12	15.30	7000
×18	11.48	1000	×14	17.86	2500
×20	12.76	1100	×15	19.14	2000
×24	15.32	1500	×16	20.40	2400
			×18	22.96	2500
1-4 × 7	5.95	1200	×20	25.50	1200
× 8	6.80	1400	×22	28.06	1000
× 9	7.65	3500	×24	30.60	600
×10	8.50	5500	×26	33.16	500
×12	10.20	6700	×28	35.72	500
×14	11.90	4600	×30	38.28	400
×15	12.75	2000			
×16	13.60	1500	7-16× 7	10.41	1000
×18	15.30	2400	× 8	11.90	1700
×20	17.00	1000	× 9	13.40	1500
×22	18.69	1200	×10	14.88	1000
×24	20.40	1000	×12	17.85	1300
×26	22.12	800	×14	20.82	1400
×28	23.80	600	×16	23.80	750
×30	25.50	600	×18	26.79	1000
			×20	29.75	800
5-16× 7	7.44	2400	×22	32.72	600
× 8	8.50	1800	×24	35.72	700
× 9	9.56	1600	×26	38.68	600
×10	10.62	1300	×28	41.65	500
×12	12.75	4500	×30	44.64	500
×14	14.88	1400			
×15	15.94	1000	1-2 × 7	11.90	1500
×16	17.00	1300	× 8	13.60	6000
×18	19.12	2200	× 9	15.30	1000
×20	21.24	1000	×10	17.00	600
×22	23.36	1000	×12	20.40	6000
×24	25.52	1200	×14	23.80	3200
×26	27.62	750	×15	25.50	1600

All sizes furnished in lengths 1–45 feet.

UNIVERSAL ROLLED PLATES
CONTINUED

Size	Weight per Lineal Foot	Average Stock Lineal Ft.
1-2 ×16	27.20	2200
×18	30.60	1700
×20	34.00	1000
×22	37.40	900
×24	40.80	1100
×26	44.20	800
×28	47.60	400
×30	51.00	500
9-16× 8	11.90	800
×10	14.88	1000
×12	17.85	1500
×14	20.82	900
×16	23.80	600
5-8 × 7	14.87	1000
× 8	17.00	3200
× 9	19.13	1200
×10	21.25	1000
×12	25.50	2750
×14	29.74	2400
×15	31.88	1900
×16	34.00	1200
×18	38.25	1000
×20	42.50	950
×22	46.76	800
×24	51.00	1100
×26	55.24	700
×28	59.49	500
×30	63.76	500
3-4 × 7	17.85	1600
× 8	20.40	2100
× 9	22.96	1000
×10	25.50	950
×12	30.60	3500
3-4 ×14	35.71	2000
×15	38.26	1500
×16	40.80	1800
×18	45.92	1000
×20	51.00	1100
×22	56.10	850
×24	61.20	800
×26	66.32	600
×28	71.42	400
×30	76.53	500
7-8 × 8	23.80	1600
×10	29.75	1500
×12	35.70	1800
×24	71.40	400
×30	89.24	300
1 × 7	23.80	500
× 8	27.20	600
× 9	30.60	400
×10	34.00	500
×12	40.80	1100
×14	47.60	700
×16	54.40	600
×18	61.20	600
×20	68.00	400
×24	81.60	350
×30	102.00	300
1 1-4 × 8	34.00	900
×12	51.00	380
1 1-2 × 8	40.80	450
1 3-4 × 8	47.60	150
2 × 8	54.40	250

All sizes furnished in lengths 1–45 feet.

TANK STEEL PLATES

STANDARD SIZES—SHEARED PLATES OPEN HEARTH TANK QUALITY

In case of shortage on these stock sizes we are cutting without charge from longer lengths and require slightly longer time for shipment.

Size	Average Stock	Size	Average Stock	Size	Average Stock
No. 8		**3-16**		**3-16**	
28× 96	90	36×360	10	72×120	60
30× 96	80	38×120	40	72×138	35
30×120	110	38×138	30	72×144	50
36× 96	120	40× 98	50	72×156	30
36×120	100	40×120	40	72×175	30
36×138	60	40×138	15	72×194	25
40× 96	90	40×144	25	72×240	10
40×120	30	40×156	20		
40×138	30	42×120	20	**1-4**	
42× 96	40	42×138	20	24×120	20
42×120	50	42×360	6	26×120	40
48× 96	100	44× 98	70	26×138	20
48×120	200	44×120	50	30× 98	100
48×138	70	44×138	20	30×120	30
48×144	80	44×144	30	30×138	25
48×156	60	44×156	35	30×420	20
54× 96	180	46×120	60	36× 98	100
54×120	60	46×138	25	36×120	120
54×138	100	48×120	150	36×138	25
54×144	75	48×138	20	36×144	50
60× 98	50	48×144	90	36×156	40
60×120	90	48×156	25	36×420	15
60×138	30	48×175	20	38× 98	40
60×144	70	48×194	15	38×120	20
60×156	35	48×360	10	38×138	20
72× 98	40	49× 98	70	38×144	20
72×120	30	50×120	20	40× 98	30
72×138	20	50×138	20	40×120	30
72×144	30	50×144	20	40×138	20
72×156	25	50×156	15	40×144	15
3-16		54× 98	30	40×156	15
24×120	50	54×120	60	42×120	50
26×120	60	54×138	20	42×138	25
26×138	25	54×144	30	42×420	7
28×120	50	54×156	30	44× 98	50
30× 98	100	54×276	8	44×120	20
30×120	100	60× 98	80	44×138	25
30×138	20	60×120	80	44×144	20
30×360	10	60×138	60	44×156	10
36× 98	150	60×144	50	46×120	20
36×120	150	60×156	70	46×138	10
36×138	30	60×175	30	48× 98	100
36×144	35	60×194	60	48×120	100
36×156	20	72× 98	30	48×138	35

TANK STEEL PLATES
CONTINUED

Size	Average Stock	Size	Average Stock	Size	Average Stock
1-4		**5-16**		**5-16**	
48×144	60	30×120	10	72×194	15
48×156	30	30×138	15	72×420	10
48×194	20	30×480	10	84×120	25
48×420	15	36×120	50	84×138	20
50×120	20	36×138	30	84×144	15
50×138	30	36×144	30	84×156	15
50×144	10	36×156	20	84×175	15
50×156	10	36×480	10	84×194	10
54× 98	30	38×120	10	84×420	5
54×120	40	38×138	15	96×120	20
54×138	25	40×120	20	96×138	15
54×144	20	40×138	15	96×144	15
54×156	20	42×120	25	96×156	10
54×194	10	42×138	20	96×175	10
54×324	5	42×480	15	96×194	30
60× 98	90	44×120	20	96×240	10
60×120	60	44×138	15		
60×138	25	44×144	15	**3-8**	
60×144	60	44×156	15	30×120	50
60×156	30	46×120	25	30×540	45
60×175	30	46×138	20	36×120	100
60×194	20	48×120	30	36×138	25
60×312	10	48×138	20	36×540	8
72× 98	25	48×144	20	40×120	30
72×120	15	48×156	40	40×138	20
72×138	10	48×194	20	42×540	10
72×144	15	48×480	15	44×120	60
72×156	20	50×120	15	44×138	30
72×175	15	50×138	10	48×120	110
72×194	20	50×144	10	48×138	40
72×312	5	50×156	8	48×144	50
84× 98	25	54×120	15	48×156	30
84×120	25	54×420	5	48×194	20
84×138	20	60× 98	20	48×540	10
84×144	15	60×120	25	50×120	20
84×156	10	60×138	10	50×138	20
84×175	10	60×144	10	54×120	55
84×194	10	60×156	10	54×138	30
84×240	7	60×175	30	54×540	12
96× 98	30	60×194	40	57×118	20
96×120	30	60×480	10	60×120	65
96×138	20	72×120	20	60×138	50
96×144	20	72×138	35	60×144	60
96×156	15	72×144	30	60×156	50
96×175	10	72×156	30	60×194	25
96×194	10	72×175	15	60×540	10

TANK STEEL PLATES
CONTINUED

Size	Average Stock	Size	Average Stock	Size	Average Stock
3-8		**3-8**		**1-2**	
65×118	25	96×232½	10	72½×156	15
72½×118	15	96×300	8	72½×194	15
72½×138	15	**7-16**		72½×212½	15
72½×144	30	60×540	5	72½×232½	10
72½×156	30	**1-2**		72½×540	4
72½×194	20	30×120	50	84×120	25
72½×212½	12	30×540	10	84×540	5
72½×232½	10	36×120	50	96×118	30
72½×540	6	36×540	6	96×232½	20
84×120	25	40×120	35	96×480	4
84×138	20	42×120	20	**5-8**	
84×144	15	42×540	8	30×540	12
84×156	15	48×120	65	36×540	10
84×194	12	48×540	5	42×540	6
84×212½	10	54×120	20	48×540	8
84×232½	10	54×540	5	60×540	5
84×540	5	60×120	35	**3-4**	
96×118	15	60×540	4	30×540	8
96×144	15	65×118	20	36×540	10
96×156	25	72½×118	30	42×540	8
96×194	20	72½×138	20	48×540	10
96×212½	10	72½×144	20	60×480	4

AMERICAN INGOT IRON PLATES

Tank quality plates of American Ingot Iron especially suited for flumes, furnaces, metal boats, mine cars, chutes, bins and vats and where resistance to corrosion is very desirable. They are soft and will stand ordinary flanging satisfactorily.

Size, Inches	Weight per Sheet	Average Stock	Size, Inches	Weight per Sheet	Average Stock	Size, Inches	Weight per Sheet	Avg. Stock
1-4			**8**			**12**		
36×144	367	5	60× 96	286	5	60×156	284.4	11
48× 96	333	7	60×144	420	4	**14**		
48×144	490	6	**10**			36× 96	77	68
60× 96	417	5	36× 96	135	15	36×120	93.7	70
60×144	613	4	36×120	136.8	30	48×120	125	30
3-16			48×120	225	35	48×156	162.5	15
36×144	275	5	48×156	292.5	53	60×120	160	10
48× 96	239	10	60×120	286.9	40	60×156	228	8
48×144	367	6	60×156	265.6	30	**16**		
60× 96	312	11	**12**			36× 96	60	28
60×144	458	6	36× 96	105	20	36×120	75	25
8			36×120	131.3	27	48×120	100	49
36×144	232	5	48×120	175	52	48×156	133	15
48× 96	224	6	48×156	227.5	15	60×120	121	23
48×144	336	6	60×120	214.4	10	60×156	177	20

TANK STEEL PLATES

LONG LENGTHS—SHEARED PLATES

These plates will be cut promptly without charge to any length three feet and over.

Size, Inches	Length, Feet	Weight per Foot	Average Stock Lineal Ft.	Size, Inches	Length, Feet	Weight per Foot	Average Stock Lineal Ft.
3-16×30	30	19.12	1000	3-8 ×54	45	68.88	1350
36	30	22.96	2100	60	45	76.56	1300
42	30	26.80	1400	72	45	91.84	800
48	30	30.64	2500	84	45	107.12	480
54	23	34.40	900	96	25	122.40	400
60	20	38.24	1800				
72	20	45.92	1900	7-16×60	45	89.28	390
1-4 ×30	35	25.50	3000	1-2 ×30	45	51.00	2250
36	35	30.59	6000	36	45	61.20	900
42	35	35.68	1750	42	45	71.40	1300
48	35	40.80	3000	48	45	81.60	450
54	27	45.92	1400	54	45	91.84	1200
60	26	51.00	2500	60	45	102.00	1300
72	26	61.18	2500	72	45	122.40	1200
84	20	71.36	900	84	45	142.80	450
				96	40	163.20	400
5-16×30	40	31.88	2000				
36	40	38.24	3800	5-8 ×30	45	63.76	450
42	40	44.64	1200	36	45	76.50	450
48	40	51.04	1900	42	45	89.28	300
54	35	57.36	1200	48	45	102.00	400
60	40	63.76	3500	60	45	127.52	400
72	35	76.48	1700	72	40	153.00	400
84	35	89.28	1000				
96	20	102.08	400	3-4 ×30	45	76.53	370
				36	45	91.84	400
3-8 ×30	45	38.28	4000	42	45	107.12	250
36	45	45.92	4000	48	45	122.40	300
42	45	53.56	2200	60	40	153.06	290
48	45	61.20	3900	72	40	183.60	200

DEFINITION OF THE TERM, TANK STEEL

Tank Steel is the only grade of plate steel not covered by a specification. It may be material which fails in some essential to meet a definite specification for which it was rolled. The tensile strength of Tank Steel may be as low as 48,000 pounds or as high as 75,000 pounds. Because of the uncertainty of its physical properties it should not be used for high pressure tanks, pipe, etc., and can not be depended upon to stand flanging, sharp bending, etc., without fracture.

PLATES FOR STANDARD BOILERS

The following is a list of plates and heads of Flange Steel, 60,000 pounds T. S., for standard sizes of tubular boilers.

Plates marked thus * provide for extension of boiler shell to form smokebox.

Pressures marked thus † denote longitudinal joints to have butt straps.

Diameter, Inches	Length, Feet	Pressure, Pounds	SHELL PLATES No.	SHELL PLATES Size, Inches	HEADS No.	HEADS Size, Inches
36	8	100	2	118× 50 ×¼	2	41 ×⅜
			1	118× 96 ×¼		
			2	118× 55 ×¼*		
			1	118×107½×¼*		
36	10	100	2	118× 61½×¼	2	41 ×⅜
			2	118× 67½×¼*		
36	12	100	1	118× 50 ×¼	2	41 ×⅜
			1	118× 96 ×¼		
			2	118× 73½×¼		
			2	118× 80 ×¼*		
44	10	100	2	143× 61½×¼	2	49 ×⅜
			2	143× 67½×¼*		
			1	143× 61½×¼		
			1	143× 85½×¼		
44	12	100	2	143× 73½×¼	2	49 ×⅜
			2	143× 80 ×¼*		
44	14	100	2	143× 85½×¼	2	49 ×⅜
			2	143× 92 ×¼*		
48	12	100	2	155× 73½×$\frac{9}{32}$	2	53 ×$\frac{7}{16}$
			2	155× 80 ×$\frac{9}{32}$*		
		125†	2	151× 73½×$\frac{5}{16}$ Straps ¼	2	53 ×$\frac{7}{16}$
			2	151× 80 ×$\frac{5}{16}$* Straps ¼		
		150†	2	151× 73½×$\frac{11}{32}$ Straps ¼	2	53 ×$\frac{7}{16}$
			2	151× 80 ×$\frac{11}{32}$* Straps ¼		
48	14	100	2	155× 85½×$\frac{9}{32}$	2	53 ×$\frac{7}{16}$
			2	155× 92 ×$\frac{9}{32}$*		
		125†	2	151× 85½×$\frac{5}{16}$ Straps ¼	2	53 ×$\frac{7}{16}$
			2	151× 92 ×$\frac{5}{16}$* Straps ¼		
48	14	150†	2	151× 85½×$\frac{11}{32}$ Straps ¼	2	53 ×$\frac{7}{16}$
			2	151× 92 ×$\frac{11}{32}$* Straps ¼		
54	14	100	2	174× 85½×$\frac{5}{16}$	2	59 ×$\frac{7}{16}$
			2	174× 92 ×$\frac{5}{16}$*		
		125†	2	171× 85½×$\frac{11}{32}$ Straps ¼	2	59 ×$\frac{7}{16}$
			2	171× 92 ×$\frac{11}{32}$* Straps ¼		
		150†	2	171× 85½×⅜ Straps $\frac{5}{16}$	2	59 ×$\frac{7}{16}$
			2	171× 92 ×⅜* Straps $\frac{5}{16}$		
54	16	100	2	174× 98 ×$\frac{5}{16}$	2	59 ×$\frac{7}{16}$
			3	174× 71 ×$\frac{5}{16}$*		
		125†	2	171× 98 ×$\frac{11}{32}$ Straps ¼	2	59 ×$\frac{7}{16}$
			3	171× 71 ×$\frac{11}{32}$ Straps ¼		
		150†	2	171× 98 ×⅜ Straps $\frac{5}{16}$	2	59 ×$\frac{7}{16}$
			3	171× 71 ×⅜ Straps $\frac{5}{16}$		
60	14	100	2	194× 86 ×$\frac{11}{32}$	2	65½×½
			2	194× 94 ×$\frac{11}{32}$*		
		125†	2	189× 86 ×⅜ Straps $\frac{5}{16}$	2	65½×½
			2	189× 94 ×⅜* Straps $\frac{5}{16}$		
		150†	2	189× 86 ×$\frac{11}{32}$ Straps ⅜	2	65½×½
			2	189× 94 ×$\frac{11}{32}$* Straps ⅜		

PLATES FOR STANDARD BOILERS

CONTINUED

Diameter, Inches	Length, Feet	Pressure, Pounds	SHELL PLATES No.	SHELL PLATES Size, Inches	HEADS No.	HEADS Size, Inches
60	16	100	2	194× 98 ×11/32	2	65½×1½
			3	194× 71 ×11/32*		
		125†	2	189× 98 ×3/8 Straps 1/16	2	65½×1½
			3	189× 71 ×3/8* Straps 1/16		
		150†	2	189× 98 ×11/32 Straps 5/16	2	65½×1½
			3	189×71 ×11/32* Straps 5/16		
60	18	100	3	194× 75 ×11/32	2	65½×1½
			3	194× 79 ×11/32*		
		125†	3	189× 75 ×3/8 Straps 1/16	2	65½×1½
			3	189× 79 ×3/8* Straps 1/16		
		150†	3	189× 75 ×11/32 Straps 5/16	2	65½×1½
			3	189× 79 ×11/32* Straps 5/16		
66	16	100	2	212× 98 ×3/8	2	72 ×1½
			3	212× 71 ×3/8*		
		125†	2	208× 98 ×11/32 Straps 5/16	2	72 ×1½
			3	208× 71 ×11/32 Straps 5/16 *		
		150†	2	208× 98 ×7/16 Straps 5/16	2	72 ×1½
			3	208× 71 ×7/16* Straps 5/16		
66	18	100	3	212× 75 ×3/8	2	72 ×1½
			3	212× 80 ×3/8*		
		125†	3	208× 75 ×11/32 Straps 5/16	2	72 ×1½
			3	208× 80 ×11/32* Straps 5/16		
		150†	3	208× 75 ×7/16 Straps 5/16	2	72 ×1½
			3	208× 80 ×7/16* Straps 5/16		
72	16	100	2	232× 98 ×7/16	2	78 ×1½
			3	232× 72 ×7/16*		
		125†	2	228× 98 ×7/16 Straps 5/16	2	78 ×1½
			3	228× 72 ×7/16* Straps 5/16		
		150†	2	228× 99 ×1½ Straps 7/16	2	78 ×9/16
			3	228× 72 ×1½ * Straps 7/16		
72	18	100	3	232× 75 ×7/16	2	78 ×1½
			3	232× 80 ×7/16*		
		125†	3	228× 75 ×7/16 Straps 5/16	2	78 ×1½
			3	228× 80 ×7/16* Straps 5/16		
		150†	3	228× 75 ×1½ Straps 7/16	2	78 ×9/16
			3	228× 80 ×1½* Straps 7/16		
78	18	125†	3	247× 75 ×1½ Straps 7/16	2	84 ×9/16
			3	247× 81 ×1½* Straps 7/16		
		150†	3	247× 75 ×11/32 Straps 7/16	2	84 ×5/8
			3	247× 81 ×11/32* Straps 7/16		
78	20	125†	3	247× 83 ×1½ Straps 7/16	2	84 ×9/16
			3	247× 90 ×1½* Straps 7/16		
		150†	3	247× 83 ×11/32 Straps 7/16	2	84 ×5/8
			3	247× 90 ×11/32* Straps 7/16		

FLANGE STEEL PLATES

O. H. FLANGE STEEL—MANUFACTURERS' STANDARD SPECIFICATIONS
60,000 POUNDS TENSILE STRENGTH

Size	Average Stock
1-4	
26 ×120	15
26 ×138	10
30 ×120	10
30 ×138	5
36 ×120	15
36 ×138	15
38 ×120	5
38 ×138	5
40 ×120	10
40 ×138	5
42 ×120	5
42 ×138	10
43 ×138	20
43 ×143	15
43 ×156	10
44 ×120	5
44 ×138	10
46 ×120	7
46 ×138	5
48 ×120	10
48 ×138	10
49 × 98	15
49 ×138	5
49 ×143	5
49 ×156	5
50 ×120	10
50 ×138	7
54 ×120	5
57 ×138	5
57 ×143	5
57 ×156	10
60 × 98	15
60 ×120	25
60 ×138	7
64¾ ×138	10
64¾ ×143	5
64¾ ×156	10
64¾ ×175	5
64¾ ×194	5
72 × 98	5
72 ×120	10
72 ×138	15
72 ×143	7
72 ×156	5
72 ×175	5

Size	Average Stock
1-4	
72 ×194	5
84 × 98	15
84 ×120	20
84 ×138	15
84 ×143	10
84 ×156	12
84 ×175	10
84 ×194	5
5-16	
26 × 80	5
26 × 90	4
26 × 99	5
26 ×120	10
26 ×138	5
30 × 80	5
30 × 90	5
30 × 99	5
30 ×120	20
30 ×138	10
36 × 80	7
36 × 90	5
36 × 99	5
36 ×120	20
36 ×138	5
38 × 80	4
38 × 90	5
38 × 99	5
38 ×120	3
38 ×138	3
40 × 80	5
40 × 90	5
40 × 99	5
40 ×120	10
40 ×138	5
42 ×120	15
42 ×138	3
43 × 80	5
43 × 90	5
43 × 99	5
43 ×138	5
43 ×143	4
43 ×156	7
44 ×120	10
44 ×138	15

Size	Average Stock
5-16	
46 ×120	5
46 ×138	5
48 ×120	25
48 ×138	5
49 × 80	5
49 × 90	5
49 × 99	5
49 ×120	4
49 ×138	5
49 ×143	4
49 ×156	5
49 ×175	4
49 ×194	4
50 ×120	20
50 ×138	15
54 ×120	3
54 ×138	10
57 × 80	3
57 × 90	5
57 × 99	5
57 ×138	5
57 ×143	10
57 ×156	7
57 ×175	5
57 ×194	10
60 ×120	25
60 ×138	5
64¾ × 90	10
64¾ × 99	3
64¾ ×138	3
64¾ ×143	5
64¾ ×156	5
64¾ ×175	3
64¾ ×194	10
72½ × 99	15
72½ ×120	15
72½ ×138	10
72½ ×143	10
72½ × 56	10
72½ ×175	20
72½ ×194	25
84 ×120	15
84 ×138	5
84 ×143	10
84 ×156	10

FLANGE STEEL PLATES
CONTINUED

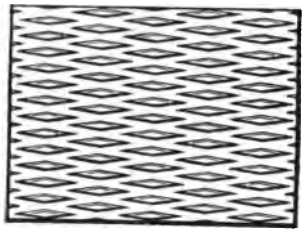
Size	Average Stock	Size	Average Stock	Size	Average Stock
5-16		**3-8**		**1-2**	
84 ×175	5	72½×108½	5	36 ×120	15
84 ×194	15	72½×118	3	40 ×120	15
96 ×120	10	72½×194	10	48 ×120	17
96 ×138	10	72½×212½	5	60 ×120	25
96 ×143	5	72½×232½	15	72 ×120	15
96 ×156	7	84 ×108½	5	75 ×228	6
96 ×175	5	84 ×118	10	84 ×180	10
96 ×194	5	84 ×194	7	98 ×228	6
107½×194	5	84 ×212½	10	107½×228	2
		84 ×232½	15		
3-8		96 ×108½	10	**5-8**	
30 ×120	5	96 ×118	5	36 ×120	15
36 ×120	10	96 ×194	5	40 ×120	25
36 ×138	15	96 ×212½	15	48 ×120	10
40 ×120	10	96 ×232½	10	60 ×120	10
40 ×138	15	107½×108½	10	72 ×120	5
44 ×120	10	107½×118	15	84 ×180	10
44 ×138	10	107½×194	5		
48 ×120	5	107½×212½	3	**3-4**	
48 ×138	5	107½×232½	5	36 ×120	20
50 ×120	10			40 ×120	15
50 ×138	3	**7-16**		48 ×120	20
54 ×120	10	36 ×120	5	60 ×120	10
54 ×138	20	40 ×120	5	72 ×120	5
60 ×120	5	48 ×120	5	84 ×180	5
60 ×138	5	60 ×120	10		
64¾×108½	10	72 ×120	10	**1**	
64¾×118	10	75 ×209	6	36 ×144	20
64¾×194	10	84 ×270	5	48 ×144	15
64¾×212½	10	98 ×209	6	60 ×144	15
64¾×232½	3	107½×209	2	72 ×144	10

HARTFORD FIRE BOX STEEL PLATES

These are open hearth firebox quality plates covered by test reports and conforming to the requirements of the Hartford Steam Boiler Inspection and Insurance Company.

Size	Average Stock	Size	Average Stock	Size	Average Stock
5/16×60×120	20	⅜×96×194	15	7/16×96×228	10
⅜×60×120	10	7/16×60×120	25	½×96×194	5

"FIRMTREAD" STEEL FLOOR PLATES



"Firmtread" Steel Floor Plates are the best possible flooring where lightness, strength and roughened surface are desired. They are rapidly supplanting cast iron and other construction for floors and stairways of fire escapes, engine rooms, breweries, gas holders, foundry platforms, machine shops, car and locomotive steps, ships, etc.

"Firmtread" Plates are *cheapest.* "Firmtread" tensile strength of 55,000 pounds and elastic limit of 35,000 pounds in contrast to cast iron with tensile of about 17,000 pounds and no elasticity, permit "Firmtread" to carry the same loads with about one-half the weight. For every square foot of floor "Firmtread" *saves 50% of weight and 30% of cost* by combining lightness and strength. "Firmtread" saves an additional amount in reducing the weight handled and shipped; and in allowing lighter framing by a lesser dead load in the flooring.

"Firmtread" Plates are *safest*—the steel has an excellent percentage of ductility—the cast iron none. "Firmtread" plates will not break under excessive loads or sudden blows—they will bend first and give warning so that load can be lessened. "Firmtread" plates do not contain concealed weakness—the rolling insures a solid plate. Cast iron plates are subject to dangerous blow holes. "Firmtread" plates insure the user against dangerous accidents; their roughened surface gives a sure foothold.

SIZES IN STOCK

Size	Average Stock	Size	Average Stock	Size	Average Stock	Size	Average Stock
3-16		**1-4**		**1-4**		**3-8**	
24× 96	25	24× 96	30	48×120	30	30× 96	25
26× 96	90	24×120	65	**5-16**		30×120	35
30× 96	45	30× 96	75	30× 96	35	36× 96	15
30×120	30	30×120	85	30×120	10	36×120	15
36× 72	25	36× 72	35	36× 96	15	42× 96	20
36× 96	85	36× 96	45	36×120	25	42×120	25
36×120	30	36×120	85	42× 96	35	48× 96	25
42× 96	15	42× 96	20	42×120	15	48×120	20
42×120	25	42×120	35	48× 96	20		
48× 96	35	48× 96	50	48×120	15		
48×120	30						

See next page for minimum sizes diamond and ribbed from mill.
See page 1184 for Safe Loads for "Firmtread" Steel Floor Plates.

"FIRMTREAD" STEEL FLOOR PLATES
CONTINUED

MAXIMUM SIZES FROM MILL, DIAMOND AND RIBBED PATTERNS

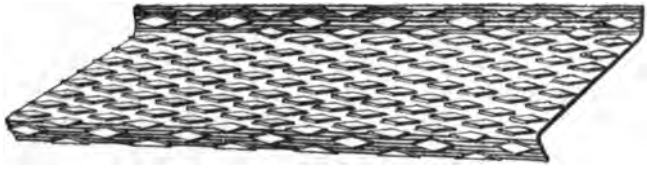
Thickness	Width in Inches				
	24	36	44	50	54
1/8	120	120	120	.....	.....
3/16	160	150	130	130	130
1/4	170	160	160	160	130
5/16	190	190	180	180	130
3/8	190	190	180	180	130
7/16	190	190	180	180	130
1/2	190	180	180	170	130
3/4	170	160	160	140	130

APPROXIMATE WEIGHTS PER SQUARE FOOT

Inches	Pounds	Inches	Pounds
1/8	8	7/16	19
3/16	8 3/4	1/2	21 1/2
1/4	11 1/4	5/8	26 1/2
5/16	13 3/4	3/4	32
3/8	16 1/4	7/8	37

These weights are approximate and may vary according to the size of the plate. Thickness in all cases is measured through the body of the plate.

"FIRMTREAD" STAIR TREADS



"Firmtread" Stair Treads are pressed from "Firmtread" diamond pattern, ribbed or plain steel plates in all sizes and styles. Treads can be furnished with nosing only or may have nosing and half or full height risers.

In strength, durability and appearance these treads are the superior of cast iron and have the additional advantage of costing and weighing less.

Plates from which treads are made are carried in stock in large quantities of different thicknesses and many sizes, enabling us to make shipment of finished treads promptly.

RAILS

A. S. C. E. STANDARDS

Weight per Yard in Pounds	Area in Square Inches	Width of Base and Height in Inches	Web in Inches	Width of Head in Inches	Height of Center of Gravity above Base	Length in Feet
8	0.78	$1\frac{9}{16}$	$\frac{5}{32}$	$\frac{13}{16}$	0.75	15 and 20
12	1.18	2	$\frac{1}{16}$	1	0.92	15, 20, 30
16	1.6	$2\frac{3}{8}$	$\frac{7}{32}$	$1\frac{11}{64}$	1.1	15, 20, 30
20	2.0	$2\frac{5}{8}$	$\frac{1}{4}$	$1\frac{11}{32}$	1.2	15, 20, 30
25	2.5	$2\frac{3}{4}$	$\frac{19}{64}$	$1\frac{1}{2}$	1.3	30
30	3.0	$3\frac{1}{8}$	$\frac{21}{64}$	$1\frac{13}{16}$	1.4	30
35	3.4	$3\frac{5}{16}$	$\frac{23}{64}$	$1\frac{3}{4}$	1.6	30
40	3.9	$3\frac{1}{2}$	$\frac{25}{64}$	$1\frac{7}{8}$	1.7	30
45	4.4	$3\frac{11}{16}$	$\frac{27}{64}$	2	1.8	30
50	4.9	$3\frac{7}{8}$	$\frac{7}{16}$	$2\frac{1}{8}$	1.9	Not in Stock
55	5.4	$4\frac{1}{16}$	$\frac{29}{64}$	$2\frac{1}{4}$	2.0	Not in Stock
60	5.9	$4\frac{1}{4}$	$\frac{31}{64}$	$2\frac{3}{8}$	2.1	33
65	6.4	$4\frac{7}{16}$	$\frac{1}{2}$	$2\frac{13}{32}$	2.2	Not in Stock
70	6.9	$4\frac{5}{8}$	$\frac{33}{64}$	$2\frac{7}{16}$	2.2	33
75	7.4	$4\frac{13}{16}$	$\frac{17}{32}$	$2\frac{15}{32}$	2.4	33
80	7.8	5	$\frac{35}{64}$	$2\frac{1}{2}$	2.4	33
85	8.3	$5\frac{3}{16}$	$\frac{9}{16}$	$2\frac{9}{16}$	2.5	33
90	8.8	$5\frac{3}{8}$	$\frac{9}{16}$	$2\frac{5}{8}$	2.5	33
95	9.3	$5\frac{9}{16}$	$\frac{9}{16}$	$2\frac{11}{16}$	2.7	Not in Stock
100	9.8	$5\frac{3}{4}$	$\frac{9}{16}$	$2\frac{3}{4}$	2.8	Not in Stock

Splices and Bolts for all sections can be furnished from stock, as well as standard sizes of track spikes.

3—SHEETS

THE sheet section includes all standard and special sheets in steel, iron, and tin plate. This section contains only lists of standard stock material. Where stock is unsuited, we can arrange direct shipment from mill.

Where not already familiar with our grades we recommend that the trade interested in special sheets advise the use for which they are desired, in order that we may apply our knowledge of these sheets and their particular properties to their advantage.

This section contains only descriptions and lists of material. Prices are given in Section 8, Weights in Section 9, and Data on the use of materials in Sections 10, 11 and 12.

3—SHEETS

	Page
Blue Annealed Steel Sheets.. (Commercial Black Sheets)	301
One Pass Cold Rolled Box Annealed (Commercial Blank Sheets)	303
Arches, Corrugated	304
Galvanized Soft Steel Sheets..	305
American Ingot Iron Sheets (Galvanized)	307
American Ingot Iron Sheets (Blue Annealed)	307
Ryerson Patent Leveled Auto Stock	308
Ryerson Extra Deep Stamping Sheets	308
Ryerson Lead Finish Sheets..	309
Ryerson Metallic Furniture Stock	309
Ryerson Uniform Blue Sheets.	309
Ryerson "C" Pickled Sheets..	310
Wood's Refined Smooth Finished Sheets	310
Ryerson Electrical Sheets....	311
Ridge Roll, Corrugated	311
Wood's "A" Planished Sheets	312
Wood's "A" Planished Locomotive Jacket	312
Wellsville Polished Sheets....	312
Corrugated Sheets	313
Galvanized Nails and Lead Washers	313
Roofing and Siding	314

ASSOCIATED SUBJECTS

	Section
Tank, Sheet and Tinners' Rivets	§ 5
Perforated Steel Sheets and Plates	§ 6
Price Classification, Extras...	§ 8
Cutting Extras	§ 8
Weight of Black Sheets	§ 9
Weight of Galvanized Sheets.	§ 9
Iron and Steel Standard Gauges	§ 9

Complete Alphabetical Index will be found on last four pages of the book.

BLACK SOFT STEEL SHEETS

BLUE ANNEALED OR HOT ROLLED OPEN ANNEALED

Size	Estimated Weight per Sheet	Average Stock Sheets	Size	Estimated Weight per Sheet	Average Stock Sheets
No. 10			**No. 10**		
24× 96	92.0	400	60×156	373.0	150
24×120	115.0	500	72× 96	275.4	125
26× 96	99.5	600	72×120	344.3	150
26×108	111.9	300	72×138	395.9	100
26×120	124.3	450	72×144	413.1	90
28× 96	107.1	400	72×156	447.6	100
28×108	120.5	250			
28×120	133.9	500			
30× 96	114.7	850	**No. 12**		
30×108	129.1	380	24× 96	71.4	750
30×120	143.4	500	24×120	89.3	550
36× 72	103.3	400	26× 96	77.3	600
36× 77	110.5	250	26×120	96.7	500
36× 96	137.7	800	28× 96	83.3	350
36×108	154.9	500	28×120	104.1	400
36×120	172.1	650	30× 96	89.2	600
36×144	206.6	500	30×108	100.4	380
40× 96	153.0	350	30×120	111.6	700
40×120	191.3	400	36× 77	85.9	300
42× 96	160.6	400	36× 84	93.7	300
42×108	180.7	300	36× 96	107.1	900
42×120	200.8	450	36×108	120.5	600
48× 77	147.2	300	36×120	133.9	1000
48× 84	160.7	200	36×144	160.6	850
48× 96	183.6	550	40× 96	119.4	400
48×108	206.5	400	40×120	149.2	400
48×120	229.5	800	42× 96	124.9	500
48×138	263.9	500	42×120	156.2	600
48×144	275.4	450	48× 77	114.5	500
48×156	298.4	300	48× 84	124.9	350
54× 77	165.7	250	48× 96	142.8	700
54× 96	206.6	250	48×108	160.6	450
54×120	258.2	350	48×120	178.5	900
54×138	296.9	200	48×127	188.9	250
54×144	309.8	200	48×138	205.2	300
54×156	335.7	150	48×144	214.2	500
60× 77	183.7	200	48×156	232.0	250
60× 96	229.5	220	54× 77	128.8	250
60×120	286.9	250	54× 96	160.6	280
60×138	329.9	130	54×108	180.7	175
60×144	344.3	130	54×120	200.8	300

BLACK SOFT STEEL SHEETS
CONTINUED

BLUE ANNEALED OR HOT ROLLED OPEN ANNEALED

Size	Estimated Weight per Sheet	Average Stock Sheets	Size	Estimated Weight per Sheet	Average Stock Sheets
No. 12			**No. 14**		
54×138	230.9	250	48×144	153.0	350
54×144	240.9	175	48×156	165.7	160
54×156	261.0	125	54× 77	92.0	300
60× 77	143.2	200	54× 96	114.7	200
60× 96	178.5	300	54×120	143.4	300
60×120	223.1	250	54×138	164.9	150
60×138	256.6	125	54×144	172.1	150
60×144	267.7	120	54×156	186.4	150
60×156	290.0	100			
			No. 16		
No. 14			24× 96	40.8	1200
24× 96	51.0	600	24×108	45.9	350
24×108	57.4	250	24×120	51.0	900
24×120	63.7	450	26× 96	44.2	850
26× 96	55.2	680	26×108	49.7	250
26×108	62.2	300	26×120	55.2	600
26×120	69.1	300	28× 96	47.6	750
28× 96	59.5	500	28×108	53.5	400
28×108	66.9	200	28×120	59.5	600
28×120	74.4	690	30× 96	51.0	1100
30× 96	63.7	600	30×108	57.4	420
30×108	71.7	400	30×120	63.7	940
30×120	79.7	750	36× 77	49.1	900
36× 77	61.3	275	36× 96	61.2	1500
36× 96	76.5	1000	36×108	68.8	350
36×108	86.1	500	36×120	76.5	1600
36×120	85.6	750	36×144	91.8	600
36×144	114.7	400	40× 96	68.0	280
40× 77	67.9	150	40×120	85.0	300
40× 96	85.0	300	42× 96	71.4	660
40×120	106.2	400	42×120	89.2	550
42× 96	89.2	600	42×144	107.1	350
42×120	111.6	450	48× 77	65.5	200
48× 77	81.8	175	48× 96	81.6	600
48× 84	89.2	200	48×108	91.8	200
48× 96	102.0	850	48×120	102.0	580
48×108	114.7	250	48×138	117.3	300
48×120	127.5	850	48×144	122.4	350
48×127	134.9	260	54× 96	91.8	100
48×138	146.6	300	54×120	114.8	100

No. 16 gauges are One Pass Cold Rolled and Box Annealed.

BLACK SOFT STEEL SHEETS

ONE PASS COLD ROLLED AND BOX ANNEALED

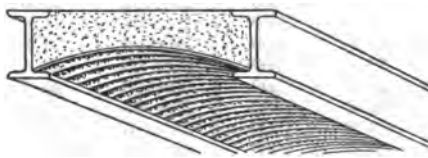
Size	Estimated Weight per Sheet	Average Stock Sheets
No. 18		
24× 96	32.6	1800
24×108	36.7	400
24×120	40.8	700
26× 96	35.4	600
26×108	39.8	350
26×120	44.2	650
28× 96	38.1	500
28×108	42.8	350
28×120	47.6	700
30× 96	40.8	2000
30×108	45.9	400
30×120	51.0	1200
36× 96	49.0	900
36×108	55.1	500
36×120	61.2	1200
42× 96	57.1	350
42×120	71.4	400
48× 96	65.3	450
48×120	81.6	400
No. 20		
24× 96	24.5	1300
24×120	30.6	800
26× 96	26.5	700
26×120	33.1	700
28× 72	21.4	600
28× 84	25.0	2000
28× 96	28.6	1200
28×108	32.1	700
28×120	35.7	1500
30× 96	30.6	1500
30×120	38.2	1200
36× 96	36.7	1800
36×120	45.9	1000
42× 96	42.8	500
42×120	53.6	600
48× 96	49.0	400
48×120	61.2	350
No. 22		
24× 96	20.4	900
No. 22		
24×101	21.5	260
24×120	25.5	700
26× 96	22.1	600
26×120	27.6	400
28× 72	17.8	800
28× 84	20.8	1550
28× 96	23.8	1450
28×108	36.8	1400
28×120	29.7	750
30× 96	25.5	1500
30×120	31.9	1000
36× 96	30.6	1500
36×120	38.2	800
42× 96	35.7	400
42×120	44.6	600
No. 24		
24× 96	16.3	1800
24×101	17.2	1000
24×120	20.4	1000
26× 96	17.7	800
26×120	22.1	1700
28× 72	14.3	1000
28× 84	16.7	1500
28× 96	19.0	1200
28×101	20.0	350
28×108	21.4	600
28×120	23.8	1600
30× 96	20.4	1900
30×120	25.5	800
36× 96	24.5	1100
36×120	30.6	800
42× 96	28.6	450
42×120	35.7	600
No. 26		
24× 96	12.24	4000
24×101	12.88	3500
24×120	15.30	3500
26× 96	13.26	800
26×120	16.57	1000

BLACK SOFT STEEL SHEETS
CONTINUED

ONE PASS COLD ROLLED AND BOX ANNEALED

Size	Estimated Weight per Sheet	Average Stock Sheets	Size	Estimated Weight per Sheet	Average Stock Sheets
No. 26			**No. 27**		
28× 72	10.71	500	30×101	14.76	200
28× 84	12.50	1800	30×120	17.53	1000
28× 96	14.28	1000			
28×108	16.06	500	**No. 28**		
28×120	17.85	1200	24× 96	10.20	2600
30× 96	15.30	1100	24×101	10.73	800
30×108	17.21	500	26× 96	11.04	900
30×120	19.12	1150	28× 72	8.93	2000
36× 96	18.36	500	28× 84	10.41	1000
36×120	22.95	650	28× 96	11.90	2500
42× 96	21.42	500	28×108	13.40	950
42×120	26.77	800	28×120	14.87	1000
			30× 96	12.75	1200
No. 27					
24× 96	11.22	2300	**No. 29**		
24×101	11.80	2500	24×101	9.66	150
26×120	15.19	300			
28× 96	13.08	2800	**No. 30**		
28×101	13.77	700	24× 96	8.16	5000
28×120	16.36	1000	30× 96	10.20	3000
30× 96	14.02	1200			

CORRUGATED ARCHES



Our arched corrugated sheets are especially adapted for floors, ceilings of vaults, bridges and for location between I-beams, for all reinforced concrete construction. We are in position to furnish these to required rise or span, in all gauges from No. 26 to 18, inclusive, and can always make prompt shipment from stock.

We have a table, which we will be glad to send upon request, showing size of sheet required to form given span.

GALVANIZED SOFT STEEL SHEETS

These are soft workable sheets, full weight and true to gauge, evenly and toughly coated with non-corrosive spelter.

Size	Estimated Weight per Sheet	Average Stock
No. 10		
30× 96	116	120
30×120	145	160
36× 96	138	320
36×120	173	130
42× 96	162	130
42×120	202	130
48× 96	185	150
48×120	231	100
No. 12		
30× 96	91	420
30×120	113	180
36× 96	109	210
36×120	136	170
42× 96	127	150
42×120	159	120
48× 96	145	100
48×120	181	130
No. 14		
30× 96	66	390
30×120	82	370
36× 96	79	200
36×120	98	590
42× 96	92	190
42×120	115	140
48× 96	105	100
48×120	131	190
No. 16		
24× 96	43	240
24×120	53	150
26× 96	46	230
26×120	58	290
No. 16		
28× 96	50	360
28×101	52	110
28×120	62	460
30× 96	53	940
30×120	66	830
36× 96	64	590
36×120	80	1070
42× 96	74	260
42×120	93	150
48× 96	85	120
48×120	106	190
No. 18		
24× 96	35	400
24×120	43	360
26× 96	37	400
26×120	47	1190
28× 72	30	710
28× 84	35	380
28× 96	40	730
28×101	42	160
28×108	45	210
28×120	50	190
30× 96	43	1280
30×120	54	1470
36× 96	52	2640
36×120	65	1590
42× 96	60	220
42×120	76	130
48× 96	69	220
48×120	86	260
No. 20		
24× 96	27	1110
24×120	33	1680
No. 20		
26× 96	29	670
26×120	36	120
28× 72	23	2020
28× 84	27	590
28× 96	31	2910
28×108	35	700
28×120	39	770
30× 96	33	1290
30×120	41	1300
36× 96	40	1270
36×120	50	900
42× 96	46	390
42×120	58	320
48× 96	55	240
48×120	66	340
No. 22		
24× 96	23	960
24×120	28	1130
26× 96	24	510
26×120	30	410
28× 72	20	710
28× 84	23	940
28× 96	26	2330
28×108	30	750
28×120	33	1250
30× 96	28	1490
30×120	35	1280
36× 96	34	1850
36×120	42	610
42× 96	39	420
42×120	49	230
48× 96	45	210
48×120	56	200

Sizes carried in black sheets only can be galvanized promptly.

GALVANIZED SOFT STEEL SHEETS
CONTINUED

Size	Estimated Weight per Sheet	Average Stock	Size	Estimated Weight per Sheet	Average Stock	Size	Estimated Weight per Sheet	Average Stock
No. 24			**No. 26**			**No. 28**		
24× 96	19	2090	28×108	19	460	26× 96	14	1840
24×120	23	1360	28×120	21	1740	26×120	17	1370
26× 96	20	2380	30× 96	18	2880	28× 72	11	580
26×120	25	1970	30×120	23	2010	28× 84	13	1420
28× 72	16	1400	36× 96	22	4730	28× 96	15	1080
28× 84	19	970	36×120	27	900	28×108	16	650
28× 96	22	2750	42× 96	25	550	28×120	18	820
28×108	24	400	42×120	32	200	30× 96	16	2620
28×120	27	2240				30×120	20	810
30× 96	23	3470	**No. 27**			36× 96	19	900
30×120	29	1790	24× 96	14	1660	36×120	23	460
36× 96	28	2020	24×120	17	400			
36×120	35	2360	26× 96	15	990	**No. 30**		
42× 96	32	530	26×120	18	750	24× 96	11	380
42×120	40	370	28× 96	16	790	24×120	13	510
			28×120	20	460	26× 96	11	800
No. 26			30× 96	17	1610	26×120	14	1050
24× 96	15	1420	30×120	21	2310	28× 96	12	2310
24×120	18	1310	36× 96	20	560	28×120	15	350
26× 96	16	1550	36×120	25	520	30× 96	13	1820
26×120	20	550				30×120	16	430
28× 72	13	560	**No. 28**			36× 96	16	500
28× 84	15	790	24× 96	13	1000	36×120	20	550
28× 96	17	1600	24×120	16	420			

Sizes carried in black sheets only can be galvanized promptly.

RYERSON'S "SPECIAL" GRADES OF SHEETS

The several stocks listed and described herein are the result of an effort to develop and carry in stock, specification sheets suited for the "special" needs of certain classes of sheet users. Suggestions on stock or mill shipments for special work will be gladly furnished.

AMERICAN INGOT IRON

This iron is recommended as the best rust resisting sheet made. By securing greatest commercial purity possible and avoiding segregation, the makers have eliminated the elements which largely accelerate oxidation and corrosion of other sheets. The metal is

RYERSON'S SPECIAL" GRADES OF SHEETS
CONTINUED

soft, ductile and tough, and will stand stamping, bending, seaming, ordinary and acetylene welding, forming and flanging. Its analysis and approximate physical properties are as follows:

Sulphur	.021%	Yield Point	28250 pounds per square inch
Phosphorus	.005%	Ultimate Strength	44330 pounds per square inch
Carbon	.020%	Elongation in 8 inch	295
Manganese	Trace	Reduction of Area	602
Silicon	Trace		
Iron	99.95%		
	100 %		

AMERICAN INGOT IRON GALVANIZED SHEETS

Base sheets of ingot iron are covered with full weight zinc spelter, because the zinc as an electro-positive to iron, has a neutralizing electrolytic effect on its corrosion. Recommended as excellent non-corrosive sheets for metal shingles, siding, roofing, metal window frames, refrigerators, skylights, grain elevators, etc.

Size	Average Stock Sheets	Size	Average Stock Sheets	Size	Average Stock Sheets	Size	Average Stock Sheets
No. 18		**No. 22**		30× 96	150	**No. 27**	
24×96	180	24×96	150	30×120	175	28× 96	150
28×96	150	28×96	200	32× 96	60	30× 96	100
30×96	150	30×96	170	32×120	100		
36×96	120	36×96	150	36×120	100	**No. 28**	
						24× 96	200
No. 20		**No. 24**		**No. 26**		28× 96	250
24×96	160	24× 96	100	24× 96	150	28×120	300
28×96	160	24×120	100	28× 96	250	30× 96	250
30×96	130	26× 96	200	30× 96	100	30×120	180
36×96	130	28× 96	200	36× 96	100	36× 96	170
		28×120	200	28×120	100		

AMERICAN INGOT IRON BLUE ANNEALED SHEETS

Size	Average Stock Sheets	Size	Average Stock Sheets	Size	Average Stock Sheets	Size	Average Stock Sheets
No. 10		**No. 12**		**No. 14**		**No. 16**	
36× 96	40	36× 96	50	36× 96	40	36× 96	60
36×120	50	36×120	60	36×120	40	36×120	60
48×120	50	48×120	60	48×120	50	48×120	70
48×156	40	48×156	30	48×156	35	48×156	35
60×120	35	60×120	25	60×120	30	60×120	30
60×156	30	60×156	20	60×156	30	60×156	30

RYERSON'S "EXTRA" DEEP STAMPING AND SPINNING STEEL SHEETS

This is a soft velvet or dull finish full pickled sheet steel reannealed and made for us from special analysis sheet bars, particularly suited for most difficult drawing, spinning and stamping work. It is especially suited for porcelain enameling on account of the dull porous character of the surface of the steel. It is used for enameled signs, sanitary articles and apparatus, stamped and spun sheet work of all kinds, often being substituted for brass.

Size	Estimated Weight per Sheet	Average Stock	Size	Estimated Weight per Sheet	Average Stock	Size	Estimated Weight per Sheet	Average Stock
No. 16			**No. 20**			**No. 24**		
24× 96	40.80	660	24× 96	24.48	1250	24× 96	16.32	1600
30× 96	51.00	330	30× 96	30.60	1700	30× 96	24.40	1500
No. 18			**No. 22**			**No. 26**		
24× 96	32.64	350	24× 96	20.40	1000	24× 96	12.25	400
30× 96	40.80	1200	30× 96	25.50	1800	30× 96	15.30	400

Cold Rolled Strip Steel in a large variety of gauges and widths, all qualities, is shown on page 118.

RYERSON'S PATENT LEVELED AUTO STOCK

This is a highly finished full pickled sheet, patent leveled to secure maximum smoothness and freedom from buckles. It is especially suited for the same plating and enameling as Ryerson's "C" Pickled, but used where level smooth surfaces are essential. It is specified for automobile body and fender, high class buggy and carriage body, metallic furniture and similar work.

Size	Estimated Weight Per Sheet	Average Stock Sheets	Size	Estimated Weight Per Sheet	Average Stock Sheets
No. 20			**No. 22**		
24× 96	24.00	1500	24× 96	20.00	1500
30× 96	30.00	1800	30× 96	24.90	1500
36×120	45.00	1500	36×120	38.25	1300

RYERSON LEAD FINISH SHEETS—LONG TERNES

This is a new stock of high grade terne plate—a base sheet of steel with 8 pound composite lead and tin coated surface. The close union possible between the leaded surface and solder makes this stock best suited for gasoline tanks, for motor cars and motorcycles. The sheets can be worked without splitting off the coating and are well suited for outside work.

Size	Estimated Weight Per Sheet	Average Stock Bundles	Size	Estimated Weight Per Sheet	Average Stock Bundles
No. 16			**No. 22**		
36×120	75.00	300	36×120	37.50	300
No. 18			**No. 24**		
36×120	60.00	250	36×120	30.00	200
No. 20					
36×120	45.00	400			

RYERSON METALLIC FURNITURE STOCK

These sheets are offered for builders of steel furniture, lockers, cabinets and filing systems, and similar work where perfectly flat smooth surfaces must be finished in high class paint or enamel. These sheets are full cold rolled, full pickled, re-annealed, and stretcher leveled. We recommend them for the best class of the work described above where ordinary sheets are unsatisfactory on account of finish or other special sheets on account of insufficient smoothness.

Size	Estimated Weight Per Sheet	Average Stock Sheets	Size	Estimated Weight Per Sheet	Average Stock Sheets
No. 20			**No. 22**		
24× 96	24.00	1000	24× 96	20.00	700
30× 96	30.00	1000	30× 96	24.90	500
36×120	45.00	500	36×120	38.25	600

RYERSON UNIFORM BLUE SHEETS

These are glossy, smooth finished sheets of uniform dark blue well suited for range fronts and work where good looking natural finish is desired.

Size	Estimated Weight per Sheet	Average Stock Bundles	Size	Estimated Weight per Sheet	Average Stock Bundles
No. 20			**No. 26**		
30×101	20.00	100	24×101	12.63	100
No. 22			**No. 27**		
30×101	24.90	100	24×101	11.55	100
No. 24			**No. 28**		
28×101	19.60	75	24×101	10.53	100

RYERSON'S SPECIAL "C" PICKLED STEEL SHEETS

This is a highly finished full pickled cold rolled sheet particularly suited to plated, fine painted and baked enamel-painted finishes; also soft enough for shallow stamping. It is used for fixtures, furniture parts, metal novelties, automobile bodies—especially fenders, brass finished parts, etc., where fine finish is the essential requirement.

Size	Estimated Weight per Sheet	Average Stock Sheets	Size	Estimated Weight per Sheet	Average Stock Sheets
No. 16			**No. 22**		
24× 96	40.80	250	24× 96	20.40	5500
30× 96	51.00	700	30× 96	25.50	800
No. 18			**No. 24**		
24× 96	32.64	790	24× 96	16.32	1400
30× 96	40.80	850	30× 96	20.40	2000
No. 20			**No. 26**		
24× 96	24.48	1300	24× 96	12.25	1800
30× 96	30.60	3000	30× 96	15.30	1500

WOOD'S REFINED SMOOTH FINISHED SHEETS

This is a third grade with a dark oxide surface worked into a good depth by special treatment. The sheets have clear surface with a solid color dark finish, and are popular with trade working the sheet into products where the natural finish is retained. Furnished only in unbroken bundles of about 150 pounds each.

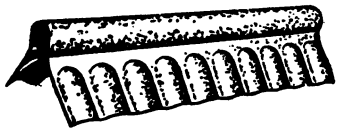
Size	Estimated Weight per Sheet	Average Stock Bundles	Size	Estimated Weight per Sheet	Average Stock Bundles
No. 20			**No. 26**		
24×101	25.25	100	24×101	12.63	100
28×101	29.45	130	28×101	14.72	60
No. 22			**No. 27**		
24×101	21.05	65	24×101	11.55	85
28×101	24.55	75	28×101	13.48	65
No. 24			**No. 28**		
24×101	16.83	120	24×101	10.53	150
28×101	19.63	140	28×101	12.26	50

RYERSON'S ELECTRICAL SHEETS

A stock especially developed for the laminations of dynamos and motors operated at medium to high speed. These sheets have great permeability, permitting free passage of inductive electrical currents set up in dynamo and motor operation. The iron losses are very low and the steel is made to prevent age losses. We recommend these sheets for motors, dynamos, large transformers, and other electrical work, where the conductivity of the steel is of value.

Size	Estimated Weight Per Sheet	Average Stock	Size	Estimated Weight Per Sheet	Average Stock	Size	Estimated Weight Per Sheet	Average Stock
No. 18			**No. 24**			**No. 28**		
24×120	40.80	100	24×120	20.40	590	30×120	15.94	300
26×104	38.30	105	26×104	19.15	390	36×108	17.21	800
30×120	51.00	50	30×120	25.50	120			
36×108	55.08	40	36×108	27.54	500			
						No. 29		
No. 20						24×120	11.47	300
24×120	30.60	280	**No. 26**			26×104	10.77	600
26×104	28.75	200	24×120	15.30	650	30×120	14.34	220
30×120	38.25	150	26×104	14.38	1000	36×108	15.49	600
36×108	41.30	200	30×120	19.12	475			
			36×108	20.65	870			
No. 22						**No. 30**		
24×120	25.50	40				24×120	10.20	650
26×104	23.95	310	**No. 28**			26×104	9.57	1260
30×120	31.87	250	24×120	12.75	680	30×120	12.75	400
36×108	34.41	100	26×104	11.97	260	36×108	13.77	2000

CORRUGATED RIDGE ROLL



We are in a position to ship immediately, both plain and corrugated ridge roll, in black, painted or galvanized quality. Standard girth is furnished unless otherwise specified. Either 1¼ or 2½ inch corrugations in gauges No. 22 and lighter are always in stock, heavier if desired, from the mill.

WOOD'S "A" PLANISHED IRON SHEETS

Sheets made of genuine charcoal hammered bloom iron with a glossy dark blue mottled surface. These have the most perfect dark metallic finish of any stock brand of sheet, and, by freedom from oxidation, retain their high grade finish under severe service, such as stove and range manufacture, metal ornaments or exposed work. Russia Iron has entirely given way to these domestic sheets.

Size	Est. Weight per Sheet	Avg. Stock Packs.	Size	Est. Weight per Sheet	Avg. Stock Packs.	Size	Est. Weight per Sheet	Avg. Stock Packs.
No. 22			**No. 23**			**No. 27**		
28×60	14.59	25	28×56	12.22	6	24×60	6.86	40
28×72	17.50	10	**No. 24**			28×60	8.02	30
No. 23			28×60	11.68	32	**No. 28**		
28×60	13.12	10	**No. 26**			28×60	7.28	20
28×72	15.72	20	28×60	8.75	25			

These sheets come in air-tight unbroken packs of about 250 pounds.

WOOD'S "A" PLANISHED LOCOMOTIVE JACKET IRON

These are sheets made under the same process and especially adapted for railroad work. The sheets are particularly well known as standard for sheathing on high-class modern locomotives.

Size	Est. Weight per Sheet	Avg. Stock Packs.	Size	Est. Weight per Sheet	Avg. Stock Packs.	Size	Est. Weight per Sheet	Avg. Stock Packs.
No. 22			**No. 23**			**No. 27**		
28×60	14.59	25	28×72	15.72	20	24×60	6.86	30
28×72	17.50	10	**No. 24**			28×60	8.02	25
No. 23			28×60	11.68	30	**No. 28**		
28×56	12.23	10	**No. 26**			28×60	7.28	15
28×60	13.12	12	28×60	8.75	20			

These sheets come in air-tight unbroken packs of about 250 pounds.

WELLSVILLE POLISHED SHEETS

Wellsville Polished is a handsome dark blue product (oiled) especially used by trade for high-class stoves, ranges, stovepipes, elbows, filing cabinets, go-carts, etc. Unbroken bundles of about 150 pounds.

Size	Est. Weight per Sheet	Avg. Stock Bdls.	Size	Est. Weight per Sheet	Avg. Stock Bdls.	Size	Est. Weight per Sheet	Avg. Stock Bdls.
No. 18			**No. 22**			**No. 26**		
24×101	33.67	80	30×101	26.30	200	28×101	14.72	350
30×101	42.08	80	**No. 24**			30×101	15.78	200
No. 20			24×101	16.00	250	**No. 27**		
24×101	25.25	100	30×101	20.00	600	24×101	11.55	250
30×101	31.56	100				28×101	13.48	150
No. 22			**No. 26**			30×101	14.47	530
24×101	19.99	100	24×101	12.63	100			

CORRUGATED ROOFING SHEETS

Our roofing is made of full weight sheets and should be compared with others on a pound price basis.

GALVANIZED

No. 16	No. 20	No. 22	No. 24	No. 27
26× 96	26× 72	26× 96	26×108	26× 96
26×120	26× 84	26×108	26×120	26×120
	26× 96	26×120		
No. 18	26×108		No. 26	No. 28
26× 72	26×120		26× 72	26× 72
26× 84		No. 24	26× 84	26× 84
26× 96	No. 22	26× 72	26× 96	26× 96
26×108	26× 72	26× 84	26×108	26×108
26×120	26× 84	26× 96	26×120	26×120

BLACK AND PAINTED

No. 16	No. 20	No. 22	No. 24	No. 27
26× 96	26× 84	26× 96	26×108	26× 96
26×120	26× 96	26×108	26×120	26×120
	26×108	26×120		
No. 18	26×120		No. 26	No. 28
26× 96			26× 72	26× 72
26×120		No. 24	26× 84	26× 84
	No. 22	26× 72	26× 96	26× 96
No. 20	26× 72	26× 84	26×108	26×108
26× 72	26× 84	25× 96	26×120	26×120

The above sheets are corrugated with standard 2½ inch corrugations, and cover 24 inches when placed in position, allowing for lap on each side.

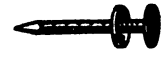
We also have all of the above, excepting the No. 16 gauge, corrugated with 1¼ inch corrugations.

We can furnish promptly in addition to the above, sheets of any special width or length corrugated with either 1¼ inch or 2½ inch corrugations.

AMERICAN INGOT IRON

Galvanized corrugated American Ingot Iron can be furnished immediately from stock, in any thickness up to and including No. 18 gauge, in any standard length and width desired.

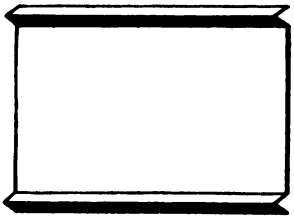
GALVANIZED NAILS AND LEAD WASHERS



We carry in stock for immediate shipment galvanized nails and lead washers for use in laying roofing sheets and siding. The lead washers with the roofing nails make an absolutely water-tight joint.

ROOFING AND SIDING

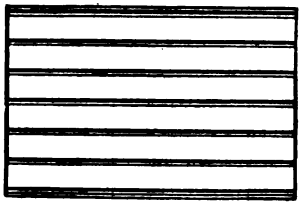
V CRIMPED ROOFING



V crimped roofing can be furnished from Chicago stock with either two or three V crimps ¾ inches high in black, painted or galvanized, with or without sticks in lengths varying from 5 to 10 feet.

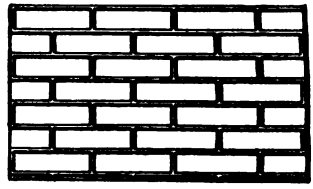
Gauge	Weight per Square Painted, Pounds	Weight per Square Galvanized, Pounds
24	111	124
26	84	99
28	69	86

BEADED SHEETS



Beaded sheets, painted or galvanized, for ceiling or siding can be furnished promptly from Chicago stock in sheets 24×96 inches and 24×120 inches.

PLAIN BRICK SIDING
PAINTED OR GALVANIZED



We are prepared to furnish plain brick siding from Chicago stock in sheets 30×60 inches in No. 26 and 28 gauge.

ROCK FACE BRICK SIDING
PAINTED OR GALVANIZED

Rock face brick siding can be furnished promptly from Chicago stock in sheets 28×60 inches in No. 28 gauge.

ROCK FACE STONE SIDING
PAINTED OR GALVANIZED

We are prepared to furnish promply from Chicago stock rock face stone siding in sheets 28×60 inches of No. 28 gauge. Size of each stone 9¼×20 inches.

Special sizes can be shipped promptly from mill.

4—TUBES AND FITTINGS

THIS section contains everything in the line of material required in the construction of boilers and tanks other than plates and rivets. Plates are shown in Section 2 and Rivets in Section 5. In reference to the lists it will be noted that tubes and fittings are carried in a variety of grades and sizes, but we are prepared to quickly supply any special grades or sizes not here shown.

Since 1842 Joseph T. Ryerson & Son have been recognized as the leading boiler supply house of this country, and have maintained this standing by the invention, development and perfection of successful boiler specialties. The services of our technical and practical boiler engineers are offered our customers in the solving of their special problems.

All material shown in this section is carried in stock in standard sizes—and in quantities large enough to supply more than the ordinary demands.

Prices shown are standard list prices.

Data on the use of materials are given in Sections 10, 11 and 12.

4—TUBES AND FITTINGS

	Page
Boiler Tubes	401
Mechanical Tubing	403
Continental Boiler	404
Morrison Furnaces	405
Loop Hangers	405
Hangers	406
Lugs	407
Flanges	408
Joint Cement	409
Nozzles	410
Braces	411
Manholes and Covers	412
Crabs	414
Plugs	415
Bolts, Stay	416
Taps, Stay Bolt	416
Bolts, Patch	417
Taps, Patch Bolt	417
Ferrules, Copper	418

ASSOCIATED SUBJECTS

	Section
Stay Bolt Iron	§ 1
Plates for Standard Boilers	§ 2
Boiler and Fitting Up Bolts	§ 5
Tube Expanders	§ 7
Boiler Tube Prices	§ 8
Mechanical Tubing Prices	§ 8
Wrought Pipe, Weights and Prices	§ 8
Cold Drawn Tubing, Weights and Prices	§ 8
Standard Boiler Settings	§12
Boiler Head Design	§12
Heating Surface of Tubes	§12
Flanges, Dimensions and River Spacing	§12

Complete Alphabetical Index will be found on last four pages of the book.

BOILER TUBES

Our stock covers a complete range of diameters and lengths usually called for in the following three grades:

LAP-WELD STEEL TUBES of best quality low carbon open hearth skelp, with a perfect welded seam and each tube tested for 500 pounds Hydrostatic pressure. Steel tubes give greatest strength, combined with ductility, so that expanding and setting can be done without injury.

CHARCOAL IRON TUBES of best puddled iron skelp, with a perfect welded seam, tested for 500 pounds pressure. These tubes are preferred under conditions where iron is less quickly pitted and corroded than steel.

SEAMLESS STEEL TUBES of best low carbon, low phosphorus, low sulphur, open hearth steel. Approximate physical properties are: Tensile Strength, 50,000 pounds; Elastic Limit, 35,000 pounds, and Elongation, 33 per cent. These tubes combine great ductility, high strength value, welding value superior to iron, great accuracy of diameter and gauge. The fact that they are pierced from solid billets and worked down to tube form insures a quality of tube superior to others in resistance to pitting and safety under cold working.

Diameter in Inches	Length in Feet	Average Stock: Lap-weld Steel	Average Stock: Charcoal Iron	Average Stock: Seamless Steel
1	×12	.....	.....	400
1¼	×10	.....	.....	550
	×12	.....	.....	400
	×14	.....	.....	175
1½	×10	.....	.....	300
	×12	.....	.....	150
	×14	.....	.....	250
	×16	.....	.....	200
1¾	× 5	250	.....	.....
	×10	500	.....	200
	×12	550	.....	225
	×14	250	.....	200
	×16	250	.....	.....
2	× 2	275	160	.....
	× 2½	100	125	.....
	× 3	150	140	150
2	× 3½	300	200	175
	× 4	400	250	.....
	× 4½	225	160	.....
	× 5	400	175	150
	× 5½	300	210	.....
	× 6	550	475	425
	× 6½	500	350	400
	× 7	275	250	260
	× 7½	250	150	150
	× 8	350	200	250
	× 9	450	300	200
	×10	350	275	200
	×11	325	.....	225
	×12	300	290	250
	×13	175	100	.....
	×14	350	175	200
	×15	240	125	.....
	×16	300	235	250
	×18	350	250	150
	×20	150	100	100

For Price List, see page 832.

BOILER TUBES

CONTINUED

Diameter in Inches	Length in Feet	Average Stock: Lap-weld Steel	Charcoal Iron	Seamless Steel
2¼	×10	200	.....	125
	×12	150	.....	200
	×14	250	.....	100
	×16	300	.....	250
2½	× 2	.....	.....	.....
	× 5	200	.....	.....
	× 5½	200	.....	.....
	× 6	250	.....	150
	× 6½	275	200	100
	× 7	200	175	150
	× 7½	150	300	.....
	× 8	250	350	.....
	× 9	125	150	.....
	×10	125	150	250
	×12	400	250	190
	×14	220	150	200
	×15	175	.....	100
	×16	300	150	225
	×18	230	.....	290
	×22	.....	.....	.....
2¾	×10	250	.....	.....
	×12	250	.....	.....
	×14	200	.....	.....
	×16	200	.....	.....
3	× 6	275	150	.....
	× 8	300	100	.....
	× 9	200	160	.....
	×10	300	150	430
	×11	160	300	.....
	×12	350	275	220
	×13	250	.....	150
	×14	250	200	300
	×15	350	500	350
	×16	350	200	300
	×18	290	120	500
	×20	200	.....	160
3¼	×10	150	.....	.....
	×12	200	.....	.....
	×14	150	.....	150
	×16	125	.....	250
	×17	.....	.....	.....
3½	×10	200	200	200
	×11½	150	.....	.....
	×12	350	150	250
	×12½	150	.....	250
	×13	250	.....	.....
	×14	300	350	300
	×15	.....	.....	.....
	×16	350	300	200
	×18	300	250	400
	×20	300	.....	.....
4	×12	300	150	.....
	×14	200	200	500
	×15	350	200	400
	×16	600	350	400
	×17	200	.....	.....
	×18	750	500	400
	×20	275	175	600
	×22	200	100	150
4½	×16	130	100	.....
	×18	120	70	60
	×20	100	120	100
	×22	75	.....	.....
5	×18	100	.....	.....
	×20	100	.....	.....
6	×16	80	.....	.....
	×18	100	.....	.....
	×20	80	.....	.....
	×22	75	.....	.....
	×24	75	.....	.....

For Price List, see page 832.

BOILER TUBES

CONTINUED

We have machinery for cutting boiler tubes to exact length rapidly and without leaving a burr on the tube. Cutting to length and threading done at a small advance over cost of the tube. Tubes which are cut from stock can be annealed upon request at a small charge.

We are also in a position to furnish promptly from Chicago stock seamless brass and copper tubes of any size required.

We can furnish safe ends out of stock in any diameter and length.

COLD DRAWN SEAMLESS STEEL TUBING FOR MECHANICAL PURPOSES

Cold Drawn Seamless Steel Tubing is now being used extensively for various mechanical and engineering purposes. It is made of high-grade material so that it machines readily and cuts free and clean. Owing to its smooth finish and slight variation in diameter and gauge it can often be used to advantage in place of parts usually machined from solid stock.

We can furnish promptly from Chicago stock any standard size of mechanical tubing required, and can secure special sizes promptly from the mill.

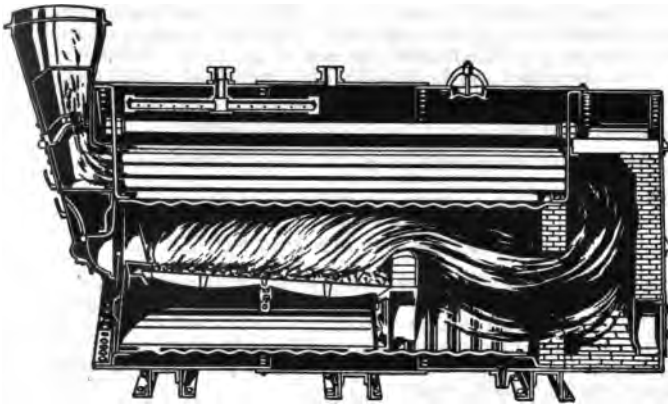
EXTRAS TO BE DEDUCTED FROM BASE DISCOUNT

Thickness B. W. G. and Fractions	Equivalent in Decimals of an Inch	Outside Diameter in Inches													
		½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½	1¾	2	2¼	2½	2¾
20	.035	35	27	22	19	17	15	14	13	12	...	...	...	...	...
18	.049	26	22	19	16	14	12	10	9	9	...	...	...	...	...
16	.065	22	19	16	14	12	10	9	8	7	7	7	7	7	7
14	.083	19	16	14	12	10	9	8	7	6	5	4	3	1	...
13	.095	16	14	12	10	9	8	7	6	5	4	2	1	...	...
12	.109	15	12	10	9	8	7	6	5	4	3	1	...	...	...
11	.120	13	11	9	8	7	6	5	4	3	2	...	...	...	...
10	.134	...	10	8	7	6	5	4	3	2	1	...	...	...	...
9/32	.156	...	...	7	6	5	4	3	2	1	...	...	...	...	...
3/16	.188	...	...	6	5	4	3	2	1	...	...	...	...	...	...
7/32	.218	...	...	...	4	3	2	1	...	...	...	...	...	...	...
¼	.250	...	...	...	...	2	1	...	...	...	...	...	...	...	...

NOTE.—Lower the base discount by the number of points indicated for each size and gauge.

THE CONTINENTAL BOILER

WITH MORISON CORRUGATED FURNACE



THIS IS THE MOST EFFICIENT, THE MOST ECONOMICAL AND THE SAFEST BOILER BUILT

Its efficiency is due primarily to the fact that the boiler is entirely self-contained. There is no brick setting to absorb and radiate the heat into the boiler room. Every unit has to pass into the water surrounding the furnace, and thus the evaporation per pound of fuel is greater than with other types of boilers, in which part of the heat is spent in heating up many thousand bricks.

Its economy rests in its simplicity of construction. There is nothing to get out of order, no brick setting to crack from the alternate heating and cooling; no cast-iron connections which may be honeycombed with blowholes, and a continual source of anxiety.

It is economical in space, and a greater amount of horse-power can be installed in a given cubical space than in any other type of boiler. It is easily cleaned, and will give as high a factor of evaporation at the end of the tenth year as at the beginning of the first.

Its safety is a matter of record. A boiler of this type has never been known to explode though more than 25,000 are in use.

The Continental Boiler with Morison Corrugated Furnaces is not patented, and may be built by any shop having the necessary equipment. We shall be pleased to send drawings and full information to any one contemplating the installation of a power plant or to any one interested in boiler design and construction.

MORISON CORRUGATED FURNACES

FOR CONTINENTAL AND LANCASHIRE BOILERS

The cut above represents the Morison Corrugated Furnace, made by the Continental Iron Works of Brooklyn, N. Y. The corrugations of Morison furnaces give them great rigidity and practically guarantee them against crushing. At the same time these corrugations greatly increase the heating surface, and, by retarding the passage of hot gases and flame, serve as baffle plates, increasing the efficiency of the boiler. Alternate expansion and contraction of the furnace tends to loosen scale from its exterior—an important consideration.

Standard stationary furnaces are made in three styles. Type "A" has two "outside" plain ends. In other words, the I. D. of the plain ends is the same as the greatest I. D. of corrugations. Type "B" has two "inside" plain ends and type "C" has one "outside" end and one "inside" end. Marine furnaces may be either straight end or flanged end. The latter are known as the removable type. Send for Continental catalogue, giving typical designs, both stationary and marine types.

PRESSED STEEL LOOP HANGERS

PRICE LIST AND DIMENSIONS

Thickness	Length Over All	Weight Each	Price Each
1/4	22	12	$0.75
5/16	22 1/4	13	1.00
3/8	22 1/4	14	1.00
1/2	22 3/4	19	1.50

RYERSON BOILER HANGERS

The design of Ryerson Hangers develops maximum strength with a minimum of material and eliminates riveting through three thicknesses of plate as is the case with the old style hand-forged hanger. The hangers are formed on hydraulic presses from Flange Steel Plate and no heating or hammering is necessary to fit them to a boiler.

PRICE LIST AND DIMENSIONS

Size Hanger	36	42	48	54	60	66	72	78	84
Thickness of Material	5/16	1/4	5/16	3/8	7/16	1/2	1/2	5/16	5/8
Width over all	9 7/8	9 7/8	11 5/8	11 5/8	13 5/8	13 5/8	15 1/2	15 1/2	15 1/2
Width between Vertical Ribs	4 1/4	4 1/4	5	5	6 1/8	6 1/8	8	8	8
Height over all	6	6	8 1/8	8 1/8	10 3/4	10 3/4	12 7/8	12 7/8	12 7/8
Width of Flange	2 3/4	2 3/4	3 3/4	3 3/4	3 3/4	3 3/4	3 3/4	3 3/4	3 3/4
Height from Center line of Boiler to Base of Rod Surface	6	7	7 1/4	8 1/4	10 1/4	11 1/4	12	13	14
Height from Center line of Boiler to lowest point of Hanger	3 5/8	4 5/8	3	4	4 1/4	5 1/4	4 1/4	5 1/2	6 1/2
Diameter of Suspending Rod	1	1 1/8	1 1/4	1 1/4	1 1/2	1 5/8	1 3/4	2	2 1/4
Size Hole Drilled for Rod	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	2 1/16	2 1/16
Number of Rivets used in each Hanger	3	3	5	5	5	5	7	7	7
Size of Rivets	5/8	5/8	5/8	3/4	3/4	7/8	7/8	1	1
Distance between Rivet lines in Flanges	7 3/4	7 3/4	9 3/8	9 3/8	11	11	13	13	13
Distance of first Rivets from bottom of Hanger	1 1/2	1 1/2	1 1/2	1 1/2	2	2	1 1/2	1 1/2	1 1/2
Center to Center of Rivets in Flanges	.....	.....	3 1/4	3 1/4	4 1/2	4 1/2	3 1/2	3 1/2	3 1/2
Rivet in Center of Top Flange from Top Edge	1 1/4	1 1/4	1 3/8	1 3/8	1 3/4	1 3/4	2 1/4	2 1/4	2 1/4
Weights, each, pounds	4	5	9	11	18	22	30	35	40
Price, each	$0.80	$0.94	$1.32	$1.44	$2.28	$2.50	$3.30	$3.60	$3.90

BEST BOILER LUG

These lugs, pressed from flange steel plate, have grooves in the bottom legs for rollers. As will be noted from the illustration, there are no flanges on the sides of the lug to interfere with punching from either side or machine riveting. The lugs are formed true to sweep, so that no heating or hammering is necessary to fit them to the boiler.

An excellent slip lug can be made of the Best Lug by cutting a U-shaped plate, rolling it to fit over the leg next to the boiler and extending about 3½ inches beyond on top and sides, and riveting it to the boiler with a filler plate between.

PRICE LIST AND DIMENSIONS

Diameter, Boiler, Inches	30	36	42	48	54	60	66	72	78	84	96
Price	$0.78	$0.94	$1.16	$1.34	$2.00	$2.32	$2.92	$3.32	$3.76	$4.20	$4.64
Weight, Pounds	6	8	10½	13	20½	25	34	40	46	50	56
Thickness	5/16	¼	¼	5/16	5/16	3/8	3/8	7/16	½	5/16	3/8
Height on Boiler	7	7	8	8	10	10	12	12	12	12	12
Length, Projection	7	7	8	8	10	10	12	12	12	12	12
Width of Lug	7	7	8	8	10	10	12	12	12	12	12
Height Above Center	1	2	2⅞	3⅞	3½	4½	4½	5	6	7	8

42 inch lugs fit 44 inch boilers perfectly and are furnished when 44 inch lugs are ordered.

RYERSON FORGED STEEL FLANGES

We carry in stock three kinds of flanges; light Tank Flanges which are especially adapted for tanks and thin plate work, standard Boiler Flanges which are for use on boilers and pressure tanks where pipe connections are necessary, and Marine Flanges which are extra heavy for high pressure.

We always have on hand a large supply of flat flanges, and flanges bent to all standard sweeps. Special sizes and sweeps can be furnished very promptly.

All of our flanges are forged from solid steel billets. The core is punched out under the hammer, so that the threads run flush to the bottom of the flange. The flanges are lathe finished to a beveled edge for calking and every flange is tested for the threads before shipment.

FORGED STEEL BOILER FLANGES

LIST PRICE AND DIMENSIONS

Size Pipe, Inches	Diameter, Inches	Thickness, Inches	Depth of Flanges, Inches	Price, Threaded	Price, Plain
¾	6	5/16	1	$1.70	$1.60
1	6	5/16	1	1.80	1.60
1¼	6½	5/16	1	1.95	1.75
1½	7	⅜	1¼	2.25	2.05
2	8	⅜	1¼	2.50	2.35
2½	8½	⅜	1½	2.60	2.45
3	9	⅜	1½	2.80	2.65
3½	9½	7/16	1½	3.20	3.00
4	10	7/16	2	3.50	3.35
4½	10½	½	2	4.20	4.00
5	11½	½	2	5.00	4.75
6	12½	½	2	6.00	5.70
7	14	⅝	2½	9.00	8.60
8	15	⅝	2½	12.00	11.40
9	16	¾	2½	20.00	17.00
10	17½	¾	2½	25.00	21.00
12	20	13/16	2½	30.00	26.00

RYERSON FORGED STEEL FLANGES

CONTINUED

FORGED STEEL TANK FLANGES

PRICE LIST AND DIMENSIONS

Nominal Size, Inches	Outside Diameter	Thickness	Depth of Hub	Diameter of Hub	Price Each, Flat		Price for Bending
					Threaded	Plain	
1	5	3/16	11/16	1 7/8	$1.60	$1.40	$0.20
1 1/4	5 1/2	1/4	11/16	2 1/16	1.75	1.55	.20
1 1/2	6	1/4	3/4	2 9/16	2.00	1.80	.25
2	6 1/2	1/4	3/4	3 1/16	2.40	2.10	.25
2 1/2	7 1/2	5/16	1	3 9/16	2.60	2.30	.30
3	8	5/16	1 1/8	4 5/16	2.80	2.65	.30
3 1/2	8 1/2	5/16	1 1/8	4 13/16	3.60	3.05	.35
4	9 1/2	3/8	1 3/16	5 3/8	4.00	3.35	.35
4 1/2	10	3/8	1 1/4	5 7/8	4.75	4.00	.40
5	11	3/8	1 5/16	6 9/16	6.50	4.75	.40
6	12	3/8	1 3/8	7 11/16	7.50	6.00	.45

FORGED STEEL MARINE FLANGES

LIST PRICE AND DIMENSIONS

Size, Inches	Diameter, Inches	Thickness, Inches	Depth of Flanges, Inches	Price, Threaded	Price, Plain
1 1/2	7	1/2	1 3/8	$2.40	$2.28
2	8	1/2	1 1/2	2.50	2.35
2 1/2	8 1/2	1/2	1 5/8	2.60	2.45
3	9	9/16	1 5/8	2.80	2.65
3 1/2	9 1/2	9/16	1 3/4	3.20	3.00
4	11	11/16	2 1/4	3.50	3.35
4 1/2	11 1/2	3/4	2 3/8	4.20	4.00
5	12 1/2	3/4	2 3/4	5.00	4.75
6	13 1/2	3/4	3	6.00	5.70

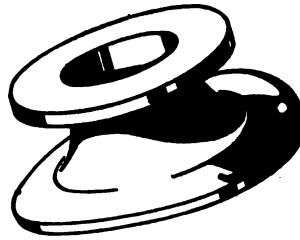
Write for discounts.

JOINT CEMENT

For the purpose of making tight the joints of light steel tanks, steel silos, gas holders and similar work, we recommend this cement as superior to tar paper, or asbestos strip, and less expensive than red lead. When applied between the surfaces of a joint it hardens in about ten hours, making a tight elastic seam unaffected by water, oil, acids or heat.

We are prepared to furnish the cement in 5, 10 or 25 pound cans, and 50, 100, 200 or 500 pound kegs, and can make shipment immediately upon receipt of order.

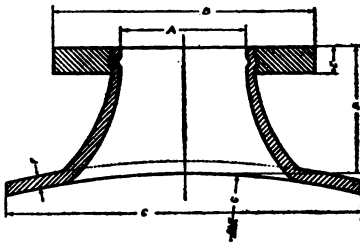
PRESSED STEEL BOILER NOZZLES



Made of flange steel, 60,000 pounds tensile strength, having body pressed from 5/8 inch and flange from 1 1/4 inch plate.

Saddle flanges are bent over solid forms to desired sweep.

Nozzles can be riveted to boilers or tanks on hydraulic or other power riveters, thereby saving extra cost of hand work and giving the job more workmanlike appearance.



Flange has a smooth even finished surface and requires no machining other than drilling for bolts.

Stronger, lighter, cheaper and in every way better than cast iron Nozzles.

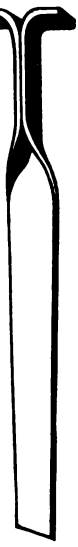
Nozzles are guaranteed tight under 1,500 pounds pressure.

SIZES IN STOCK

A Inches	B Inches	C Inches	D Inches	E Inches	F Inches	G Inches	List Price
4	10	14 3/4	5 1/2	1 1/8	5/8	48, 54, 60 66, 72	$13.50
5	11	15 3/4	5 1/2	1 1/8	5/8	60, 72 66, 78	14.00
6	12 1/2	17	5 1/2	1 1/4	5/8	66, 78 72, 84	15.00
7	14	19	6	1 1/4	5/8	72, 84 78, 90	16.00
8	15	20	6	1 3/8	5/8	48, 60 84, 96	26.00

Dimension "D" can be varied slightly.

The prices given above are for standard sweeps. Nozzles can be furnished with sweeps over or under standard at an extra of 75 cents net.



WELDLESS STEEL BOILER BRACE

Carefully made of flange steel plate, pressed into shape at one heat and annealed; assures a brace free from welds, latent strains or forging flaws. These braces are easily fitted in the boiler, have no pockets to collect scale and sediment and are so designed that the pull on the rivets is direct. There is no prying-off strain as is apparent in other forms of braces. These braces are acceptable to Steam Boiler Inspection and Insurance Companies, State Boiler Inspection Departments and to the U. S. Government when tested as required for marine work.

APPROXIMATE WEIGHT OF STOCK SIZES

Thickness in Inches	Length in Inches							
	30	36	42	48	54	60	66	72
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
7/16	15.1	18	21.6	24.3	27.2	30	33	35
1/2	18.5	20.7	24.5	30	31	33.7	38	41.8

When ordering, specify thickness and length.

Braces of special length or to meet Government or other special requirements, made to order only.

NUMBER OF BRACES USUALLY PUT IN STANDARD TUBULAR BOILERS

Diameter of Shell	36 Inch		42 Inch		44 Inch		48 Inch	
Number of Tubes	26 3 In. Tubes	26 3½ In. Tubes	30 3½ In. Tubes	18 4 In. Tubes	34 3½ In. Tubes	30 4 In. Tubes	28 3½ In. Tubes	26 4 In. Tubes
Length of Braces								
42 inch braces	4	4	4	4	6	6	5	5
48 inch braces	2	2	2	2	2	2	3	4
54 inch braces	....	....	....	....	....	....	....	....
60 inch braces	....	....	....	....	....	....	1	....
72 inch braces	....	....	....	....	....	....	....	....
Total,	6	6	6	6	8	8	9	9

Diameter of Shell	54 Inch		60 Inch			66 Inch		72 Inch	
Number of Tubes	44 3½ In. Tubes	36 4 In. Tubes	54 3½ In. Tubes	44 4 In. Tubes	54 4 In. Tubes	66 3½ In. Tubes	54 4 In. Tubes	86 3½ In. Tubes	70 4 In. Tubes
Length of Braces									
42 inch braces	....	....	....	....	....	....	....	....	....
48 inch braces	6	5	7	7	7	8	8	10	9
54 inch braces	....	....	....	....	....	....	....	7	7
60 inch braces	4	3	5	5	4	6	5	6	4
72 inch braces	2	2	2	3	2	3	2	2	2
Total,	12	10	14	15	13	17	15	25	22

NOTE.—The great variety of tube spacing and the difference in pressures makes an almost infinite variety in number, length and thickness of braces to be used. The above table, however, can be accepted as illustrating common practice in the styles of boilers named for ordinary pressures.

MANHOLES AND COVERS

MANHOLE IN HEAD WITH COVER AND FITTINGS COMPLETE

PRICE LIST

Including Flanging and Planing of Manhole, Cover, Crabs, Bolts and Gasket.

No.	Nominal Size, Inches	Actual Size, Inches	In Heads less than ¾ inch Thick	In Heads ¾ Inch and 1¼ inch Thick	In Heads ⅞ inch Thick	Castings Only	Flanging and Planing Hole Only
1	9×14	9 ×14¼	$10.00	$11.00	$12.00	$ 6.00	$4.00
2	10×16	9⅞×15½	10.00	11.00	12.00	6.00	4.00
3	11×15	10⅞×15	10.00	11.00	12.00	6.00	4.00
5	18×22	16⅝×22 3/16	20.00	.....	.....	12.00	8.00

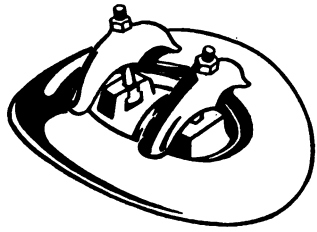
All Manhole Covers furnished as above are cast iron fitted with lead gaskets. Castings are of the finest grade of gray iron, solid and true to pattern. The gasket recess which prevents the gasket from squeezing out under pressure is an advantage not possessed by any other type. Another advantage is the handle by use of which the manhead can be located and held in place while the crabs and bolts are adjusted. Crabs for Nos. 1, 2 and 3 are of pressed steel and for No. 5 of cast iron.

Cover plates, crabs, bolts and gaskets for Manhole sizes listed above are carried in stock, other sizes can be furnished promptly.

DIRECTIONS FOR ORDERING

When ordering Manholes in heads, state size, location with reference to the rim or center of head and whether flanged the same way or opposite to rim flange.

MANHOLES AND COVERS
CONTINUED



MANHOLE SADDLE WITH COVER AND FITTINGS COMPLETE

PRICE LIST

Including Saddle Plate, Flanging and Planing of Manhole, Cover, Crabs, Bolts and Gasket.

Number	Nominal Size, Inches	Actual Size, Inches	With Saddle Plate 5/8 inch Thick or Less, for Diameter over 30 inches
1	9×14	9 ×14 1/4	$13.00
2	10×16	9 7/8×15 1/2	13.00
3	11×15	10 7/8×15	13.00
5	18×22	16 5/8×22 3/16	29.00

We carry 5/8 inch thickness Saddle Plates in stock, but can furnish 3/4 inch thickness made up to order at $15.00 for Nos. 1, 2 and 3, and $33.00 for No. 5.

Saddle Plates, 5/8 inch thick, formed to sweep for standard size of boilers and flanged for No. 2 Manhole, are carried in stock. Blank plates, 5/8 inch thick, cut to size, are also carried in stock and can be formed to sweep and manhole flanged and planed as required. All saddle plates are large enough to allow for a double row of rivets.

Pressed Steel Cover Plates for standard size Manholes can be furnished promptly.

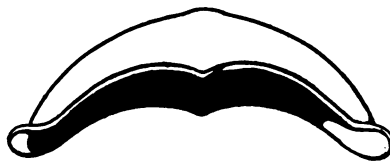
When ordering Saddle Plates, give Manhole size, inside diameter of shell on which saddle is to be used and whether short dimension of Manhole is to be lengthwise of shell as shown in the illustration or otherwise.

HANDHOLES AND COVERS
CONTINUED

Nominal Size	Punching Hole, Cover Plate and Fittings Complete	Punching Handhole Only	Cover Plate Only	Approximate Weight
3 ×4	$1.75	$1.00	$1.50	7
3½×5½	1.85	1.00	1.50	13
4 ×6	2.00	1.00	1.50	15
5 ×7	2.25	1.00	1.50	23
6 ×8	2.50	1.00	1.50	25
6 ×9	2.75	1.25	1.50	26

Handhole covers and crabs furnished from above list are cast iron. Pressed steel covers and crabs 4″×6″, 6″×8″ and 6″×10″ can be furnished promptly from factory.

PRESSED STEEL CRABS



These crabs or yokes are made of open hearth steel plate, and are of ample strength for general manhole and handhole purposes. Size No. 1 is carried in stock; other sizes can be furnished promptly from factory.

PRICE LIST AND DIMENSIONS

Number	Length Over All	Height Over All	Bolt Hole	Price	Approximate Weight
00	8	3½	13/16	$0.50	3½
0	10	4	13/16	.50	4
1	13	5	1 1/16	.60	5
2	15	5½	1 3/16	.70	10
3	16	6	1¼	.75	11
4	17	6½	1⅜	.85	13

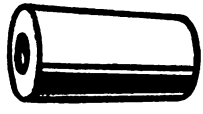
FUSIBLE PLUGS

These plugs are made of a bronze casing filled with a good banca tin and stamped in accordance with requirements of U. S. Steamboat Inspection Service.

PRICE LIST

Pipe Tap, Size	½	¾	1	1¼	1½	2
Price, Each	$0.60	$0.75	$1.00	$1.50	$2.00	$3.00

FLUE PLUGS

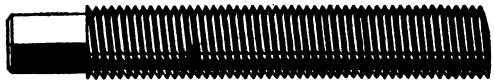


Made of good quality gray iron, smooth and uniform, these plugs will be found as satisfactory for shutting off leaking flues as the more expensive and complicated types.

PRICE LIST

Flue Size	2	2½	3	3½	4
Price, each	$0.40	$0.50	$0.60	$0.80	$1.00

BOILER STAY BOLTS



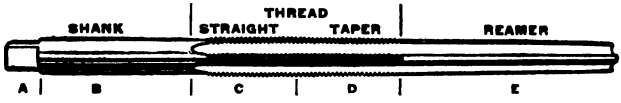
	Diameter of Stay Bolts, in Inches						
	½	⅝	¾	⅞	1⅛ and 1	1⅛	1¼
Price per foot	$0.36	$0.40	$0.60	$0.80	$1.00	$1.30	$1.50

We always carry in stock a large supply of all the above sizes in 36 inch lengths, made of high grade stay-bolt iron, and can furnish special lengths promptly.

Lengths are exclusive of heads, which are made 1 inch long unless otherwise specified.

For stay bolts less than 1 foot long above prices are per bolt. Write for discounts.

STAY BOLT TAPS



SIZES AND LIST PRICE

When ordering Stay Bolt Taps give diameter at largest part and number of threads to the inch, stating whether "V" or U. S. form of thread; also give lengths of parts A, B, C, D and E, with the length over all.

These taps will be furnished in either U. S. form or "V" form of thread, 12 to the inch at regular list and discount. They will be sent with 12 "V" threads to the inch unless otherwise specified.

Diameter given is that of the thread at its straight part.

Prices are for each inch of length 16 inches and upwards.

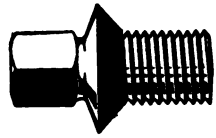
Taps shorter than 16 inches will be charged as if 16 inches long.

We regularly carry 18 and 24 inch lengths in stock.

Blank order forms will be sent on application.

Diameter, Inches	Price per Inch	Diameter, Inches	Price per Inch	Diameter, Inches	Price per Inch
¾ to ⅞ 1 1/16 to 1¼	$0.40 .55	1 1/16 to 1 1 5/16 to 1⅜	$0.45 .60	1 1/16 to 1⅛ 1 7/16 to 1½	$0.50 .70

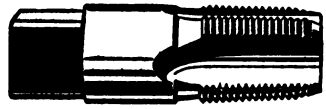
BOILER PATCH BOLTS



PRICE PER 100 TURNED AND THREADED

Length from Largest Diameter of Bevel Point	Diameter						
	½	⅝	¾	⅞ and 7/8	1 and 1	1⅛	1¼
¾	$3.75	$4.25	.....	.....	.....	.....	.....
⅞	4.00	4.50	$6.00	.....	.....	.....	.....
1	4.25	4.80	6.50	$ 9.50	$13.50	$18.50	.....
1⅛	4.50	5.10	6.80	9.85	14.00	19.25	$25.50
1¼	4.75	5.50	7.25	10.25	14.75	20.25	27.00
1½	5.25	6.50	8.25	11.25	16.25	22.50	30.50
Threads to inch	12	12	12	12	12	12	12

PATCH BOLT TAPS



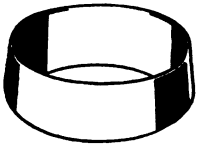
SIZES AND LIST PRICE

Diameter, Inches	Price, Each	Diameter, Inches	Price, Each	Diameter, Inches	Price, Each
½	$0.70	¾	$1.20	1	$2.00
9/16	.80	13/16	1.40	1 9/16	2.15
⅝	.90	⅞	1.60	1⅛	2.25
11/16	1.05	15/16	1.80	1¼	2.60

These taps are made especially for boilermakers. They are slightly tapered for the purpose of making the bolt a steam-tight fit and have 12 threads to the inch.

Any size furnished promptly.

PURE SHEET COPPER SEAMLESS BOILER TUBE FERRULES WITH OR WITHOUT FLANGE



STANDARD PRICE LIST PER 100

ADOPTED JULY 1, 1912

Inside Diameter, Inches	Width	Thickness of Copper						
		1/32	3/64	1/16	5/64	3/32	7/64	1/8
1	1/2	$5.10	$ 7.50	$9.50	$11.75	$13.50	$15.50	$16.50
	5/8	6.30	9.30	11.75	14.50	16.50	19.00	20.00
1 1/4	1/2	6.30	9.30	11.75	14.50	16.50	19.00	20.00
	5/8	7.80	11.60	14.50	18.25	20.50	23.50	24.75
1 1/2	1/2	7.50	11.40	14.00	17.75	19.50	23.00	24.00
	5/8	9.30*	14.20	17.00	21.75	25.00	28.50	29.75
	3/4	10.30*	.....	19.80*	.....	.....	.....	.....
1 3/4	1/2	8.70	13.20	16.25	20.50	22.50	26.00	27.25
	5/8	10.80	16.40	20.25	25.50	28.50	33.00	34.75
	3/4	12.90*	19.60	24.25*	30.50	34.50	40.00	42.00
1 7/8	1/2	9.30	14.20	17.00	21.75	25.00	28.50	30.00
	5/8	11.60	17.70	21.50	27.00	31.00	35.50	37.50
	3/4	13.90	21.20	26.00*	32.25	37.00	42.50	44.75
	7/8	16.20	24.70	30.50	37.50	43.00	49.50	52.25
	1	18.50	28.20	35.00	42.75	49.00	56.50	59.50
2	1/2	9.80	14.90	18.25	23.00	25.50	30.00	31.50
	5/8	12.30	18.60	23.00	28.75	32.00	37.50	39.50
	3/4	14.80*	22.30	27.75*	34.50	38.50	45.00	47.50
	7/8	17.30	26.00	32.50	40.25	45.00	52.50	55.25
	1	19.80	29.70	37.25	46.00	51.50	60.00	63.25
2 1/4	5/8	13.50	20.40	25.25	31.75	36.00	41.50	43.50
	3/4	16.30*	24.60	30.50*	38.25	43.00	50.00	52.50
	7/8	19.10	28.80	35.75	44.75	50.00	58.50	61.50
	1	21.90	33.00	41.00	51.25	57.00	67.00	70.50
2 1/2	5/8	15.00	22.80	28.25	35.75	39.50	46.50	49.00
	3/4	18.10*	27.40	34.00*	42.75	47.50	55.50	58.50
	7/8	21.20	32.00	39.75	49.75	55.50	64.50	68.00
	1	24.30	36.60	45.50	56.75	63.50	73.50	77.50
2 3/4	3/4	.....	.....	36.00*	.....	.....	.....	.....
3	3/4	21.90*	33.00	41.00*	51.00	57.00	66.50	70.00
	7/8	25.50	38.40	47.75	59.50	66.50	77.50	81.50
	1	29.10	43.80	54.50	68.00	76.00	88.50	93.25
3 1/4	3/4	23.70	35.70	44.25*	55.50	62.00	72.00	75.75
	7/8	27.60	41.60	51.50	64.50	72.00	84.00	88.50
	1	31.50	47.50	58.75	73.50	82.00	96.00	101.25
3 1/2	3/4	24.60*	37.00	45.75*	57.25	64.00	75.00	79.00
	7/8	29.30	44.00	54.50	68.25	76.00	89.00	93.75
	1	34.00	51.00	63.25	79.25	88.00	103.00	108.50
4	3/4	29.00*	.....	59.00*	.....	.....	.....	.....
	7/8	33.60	50.70	63.00	79.00	88.00	103.00	108.50
	1	38.40	57.90	72.00	90.25	100.00	117.00	123.25
	1 1/4	48.00	72.30	90.00	112.75	124.00	145.00	153.00

Items marked * are carried in stock. Other sizes can be furnished promptly from the factory.

Discounts furnished on application.

5—RIVETS, BOLTS AND NUTS

THE stock pages on rivets and bolts represent sizes always carried on hand in large enough quantities to insure immediate shipment, except in special cases.

The Burden Iron Rivets represent the highest possible quality in iron rivets, and in the steel rivets shown we handle nothing but first-class standard material.

Special sizes of rivets and bolts can be furnished direct from the factory.

SEE PAGES 600 TO 606

SUGGESTIONS FOR ORDERING

To avoid possible annoyance to our customers we offer below a few suggestions for ordering.

Please do not forget style of head with quality and size of rivets. Machine Bolts are carried in stock with square head and square nut only. Hexagon head bolts or square head bolts with hexagon nuts are not carried in stock, but we can have them made up and shipped direct from the factory.

All bolts will be furnished with U. S. Standard Thread unless otherwise specified.

When ordering stud bolts give the length of thread required on each end; also the length of part not threaded, and state whether or not nuts are required.

When ordering eye bolts always give inside diameter of eye, and length from center of eye to end, and advise whether or not the eye is to be welded.

Tapped nuts, unless otherwise specified, will be furnished with U. S. Standard Threads.

In ordering standard wrought washers it is only necessary to give the size of the bolt on which they are to be used.

Turnbuckles will always be furnished with stub ends unless otherwise specified.

5—RIVETS, BOLTS AND NUTS

	Page
Rivets, Burden Iron	501
Rivets, Cone Head Steel	503
Rivets, Round Head Steel	504
Rivets, Countersunk Head	505
Rivets, Tinners' or Pound	505
Rivets, Tank and Sheet	505
Bolts, Machine	508
Bolt Ends	509
Bolts, Carriage	510
Bolts, Expansion	511
Screws, Coach and Lag	511
Bolts, Stove	512
Bolts, Plow	513
Bolts, Boiler and Fitting Up	513
Bolts, Coupling	514
Bolts, Bridge and Roof	514
Studs, Milled Iron	515
Cap Screws	516
Set Screws	517
Nuts	518
Turnbuckles	522
Bands, Pipe, Tank and Silo	523
Shoes, Pipe	523
Washers, Cast Iron	524
Washers, Malleable Iron	524
Washers, Star	524
Washers, Wrought	525
Bolts, Track	526
Spikes, Track	526

PAGES 500 TO 600

ASSOCIATED SUBJECTS

	Section
Patch Bolts	§ 4
Turnbuckles, Hook and Eye	§ 6
Rivet Sets	§ 7
Rivets, Sheet, Tank and Small, Prices	§ 8
Rivets, Tinners'	§ 8
Rivets, Extras	§ 8
Machine Bolts, Weights	§ 9
Coach and Lag Screws	§ 9
Round Head Rivets and Bolts	§ 9
U. S. Hot Pressed Nuts	§ 9
Rivets, Dimensions of	§10
Shearing and Bearing Value of Rivets	§10
Strength of Bolts, Reduced Area	§12
Riveted Joints	§12
Rivet Spacing for Forged Steel Flanges	§12

Complete Alphabetical Index will be found on last four pages of the book.

BURDEN IRON RIVETS FOR BOILERS

CONE HEAD

Diameter and Length	Average Stock Kegs	Diameter and Length	Average Stock Kegs	Diameter and Length	Average Stock Kegs
1-2× ¾	20	5-8×3	15	11-16×5¼	15
× ⅞	15	×3⅛	10	×5½	15
×1	15	×3¼	30	×5¾	10
×1⅛	10	×3½	15	×6	20
×1¼	10	×3¾	10	×6½	10
×1⅜	20	×4	20	×7	5
×1½	20	×4¼	15		
×1⅝	15	×4½	10		
×1¾	30	×4¾	10	3-4×1	25
×1⅞	30	×5	20	×1⅛	30
×2	30	×5¼	10	×1¼	30
×2⅛	10	×5½	15	×1⅜	30
×2¼	15	×5¾	10	×1½	50
×2⅜	25	×6	10	×1⅝	30
×2¾	15	×6¼	5	×1¾	60
×3	20	×6½	10	×1⅞	50
×3¼	15	×7	5	×2	60
×3½	15			×2⅛	30
×4	10			×2¼	70
×4½	10	11-16×1	10	×2⅜	35
×5	5	×1⅛	10	×2½	80
		×1¼	15	×2⅝	30
		×1⅜	15	×2¾	20
5-8× ¾	30	×1½	10	×2⅞	30
× ⅞	25	×1⅝	15	×3	60
×1	25	×1¾	10	×3¼	30
×1⅛	20	×1⅞	10	×3½	40
×1¼	30	×2	15	×3¾	15
×1⅜	20	×2⅛	10	×4	20
×1½	40	×2¼	15	3-4×4¼	15
×1⅝	30	×2½	20	×4½	10
×1¾	15	×2¾	15	×5¾	10
×1⅞	15	×3	25	×6	15
×2	40	×3¼	10	×6¼	10
×2⅛	20	×3½	15	×6½	20
×2¼	20	×3¾	20	×6¾	10
×2⅜	10	×4	15	×7	20
×2½	50	×4¼	15	×7¼	10
×2⅝	20	×4½	20	×7½	25
×2¾	20	×4¾	10	×8	15
×2⅞	15	×5	10	×8½	10

Countersunk or round head Burden Iron Rivets can be furnished promptly from the mill.

BURDEN IRON RIVETS FOR BOILERS

CONE HEAD—CONTINUED

Diameter and Length	Average Stock Kegs	Diameter and Length	Average Stock Kegs	Diameter and Length	Average Stock Kegs
13-16×1½	10	7-8×2⅝	15	11-16×4½	20
×1⅝	15	×2¾	20	×5	15
×1¾	20	×3	10	×5½	10
×1⅞	15	×3⅛	10	×6	10
×2	20	×3¼	15	×6½	15
×2¼	20	×3½	30	×7	10
×2⅜	15	×3¾	20		
×2½	20	×4	15	1×2	5
×2⅝	10	×4¼	15	×2¼	15
×2¾	10	×4½	20	×2⅜	15
×3	15	×4¾	15	×2½	20
×3¼	15	×5	20	×2⅝	10
×3½	20	×5¼	15	×2¾	15
×3¾	10	×5½	20	×2⅞	25
×4	15	×5¾	10	×3	20
×4¼	10	×6	20	×3¼	20
×4½	10	×6¼	30	×3½	25
×4¾	10	×6½	35	×3¾	10
×5	15	×6¾	20	×4	20
×5¼	15	×7	30	×4¼	10
×5½	10	×7¼	20	×4½	10
×5¾	15	×7½	10	×4¾	10
×6	15	×7¾	10	×5	15
×6¼	15	×8	15	×5¼	10
×6½	10	×8½	10	×5½	10
×6¾	20	×9	20	×6	15
×7	15	×10	15	×6¼	10
×7½	10	×11	10	×6½	15
				×7	15
7-8×1¼	10	15-16×2	10		
×1⅜	25	×2¼	10	1 1-8×3	10
×1½	20	×2⅜	5	×3¼	10
×1⅝	15	×2½	10	×3½	15
×1¾	20	×2¾	20	×4	20
×1⅞	10	×3	20	×4¼	15
×2	30	×3¼	15	×4½	10
×2⅛	15	×3½	25	×4¾	20
×2¼	20	×3¾	20	×5	20
×2⅜	15	×4	30	×10	15
×2½	30	×4¼	15		

Countersunk or round head Burden Iron Rivets can be furnished promptly from the mill.

STEEL BOILER RIVETS

CONE HEAD

Diameter and Length	Average Stock Kegs	Diameter and Length	Average Stock Kegs	Diameter and Length	Average Stock Kegs	Diameter and Length	Average Stock Kegs
1-2× 3/4	10	**5-8**×3 1/2	25	**3-4**×1 3/4	60	**7-8**×2 5/8	30
× 7/8	25	×3 3/4	20	×1 7/8	40	×2 3/4	50
×1	10	×4	25	×2	50	×3	30
×1 1/8	25	×4 1/4	30	×2 1/8	40	×3 1/8	20
×1 1/4	40	×4 3/8	20	×2 1/4	60	×3 1/4	30
×1 3/8	20	×4 1/2	25	×2 3/8	60	×3 3/8	30
×1 1/2	45	×4 3/4	25	×2 1/2	50	×3 1/2	20
×1 5/8	30	×5	20	×2 5/8	50	×3 3/4	20
×1 3/4	30	×5 1/4	20	×2 3/4	30	×4	20
×1 7/8	20	×5 1/2	15	×2 7/8	40	×4 1/4	15
×2	30	×5 5/8	10	×3	50	×4 1/2	15
×2 1/8	30	×5 3/4	15	×3 1/8	30	×4 3/4	20
×2 1/4	30	×6	15	×3 1/4	20	×5	20
×2 1/2	20			×3 3/8	30	×5 1/2	15
×2 3/4	30	**11-16**×1 1/8	15	×3 1/2	40	×6	20
×3	15	×1 1/4	20	×3 5/8	30	×6 1/2	15
×3 1/4	20	×1 3/8	20	×3 3/4	20	×6 3/4	10
×3 1/2	15	×1 1/2	20	×4	20	×7	15
×3 3/4	15	×1 5/8	15	×4 1/4	15	×7 1/8	10
×4	20	×1 3/4	20	×4 1/2	15		
		×1 7/8	20	×4 5/8	25	**1**×1 7/8	15
5-8× 3/4	10	×2	25	×4 3/4	20	×2	20
× 7/8	20	×2 1/8	15	×5	15	×2 1/8	20
×1	20	×2 1/4	15	×5 1/4	15	×2 1/4	40
×1 1/8	15	×2 1/2	25	×5 1/2	15	×2 3/8	25
×1 1/4	50	×2 3/4	40	×5 3/4	10	×2 1/2	40
×1 3/8	40	×3	20	×6	20	×2 3/4	40
×1 1/2	40	×3 1/4	20	×6 1/2	20	×3	35
×1 5/8	50	×3 1/2	20	×7	10	×3 1/8	20
×1 3/4	50	×3 3/4	15	×7 1/2	15	×3 1/4	30
×1 7/8	40	×4	10	×8	10	×3 1/2	20
×2	40	×4 1/4	10			×3 3/4	15
×2 1/8	30	×4 1/2	15	**7-8**×1 3/8	10	×3 7/8	15
×2 1/4	50	×4 3/4	10	×1 1/2	25	×4	20
×2 3/8	35	×5	10	×1 5/8	20	×4 1/4	20
×2 1/2	35	×5 1/4	10	×1 3/4	35	×4 1/2	15
×2 5/8	50			×1 7/8	20	×4 3/4	10
×2 3/4	50	**3-4**×1 1/8	30	×2	50	×5	25
×2 7/8	40	×1 1/4	35	×2 1/8	30	×5 1/4	10
×3	35	×1 3/8	20	×2 1/4	50	×5 1/2	15
×3 1/8	15	×1 1/2	50	×2 3/8	40	×6	15
×3 1/4	35	×1 5/8	50	×2 1/2	50	×6 1/4	10

STRUCTURAL RIVETS

BUTTON OR ROUND HEAD

Diameter and Length	Average Stock Kegs	Diameter and Length	Average Stock Kegs	Diameter and Length	Average Stock Kegs
1-2× 3/4	50	5-8×3	30	7-8×1 5/8	20
× 7/8	35	×3 1/4	20	×1 3/4	15
×1	60	×3 1/2	10	×2	25
×1 1/8	25	×4	15	×2 1/4	10
×1 1/4	30			×2 3/8	20
×1 3/8	30	3-4×1	25	×2 1/2	50
×1 1/2	100	×1 1/8	15	×2 5/8	30
×1 5/8	40	×1 1/4	15	×2 3/4	25
×1 3/4	70	×1 3/8	20	×2 7/8	20
×1 7/8	50	×1 1/2	50	×3	40
×2	20	×1 5/8	15	×3 1/8	20
×2 1/4	25	×1 3/4	85	×3 1/4	85
×2 1/2	50	×1 7/8	35	×3 1/2	20
×2 3/4	20	×2	155	×3 3/4	40
×3	20	×2 1/8	110	×4	50
×3 1/2	15	×2 1/4	200	×4 1/4	15
×4	15	×2 3/8	75	×4 1/2	40
		×2 1/2	190	×4 3/4	45
5-8× 3/4	25	×2 5/8	40	×5	20
× 7/8	20	×2 3/4	120	×5 1/4	20
×1	25	×2 7/8	135	×5 1/2	15
×1 1/8	15	×3	85	×6	25
×1 1/4	15	×3 1/4	50		
×1 3/8	40	×3 1/2	85	1 ×2 1/2	20
×1 1/2	30	×3 3/4	100	×3	20
×1 5/8	20	×4	35	×3 1/4	15
×1 3/4	70	×4 1/4	75	×3 1/2	15
×1 7/8	20	×4 1/2	65	×3 3/4	20
×2	100	×5	30	×4	25
×2 1/8	30	×5 1/4	35	×4 1/4	10
×2 1/4	65			×4 1/2	10
×2 3/8	20	7-8×1 1/4	20	×5	20
×2 1/2	30	×1 3/8	20	×5 1/2	15
×2 5/8	15	×1 1/2	20	×6	20
×2 3/4	25				

Carried in stock in 100-pound kegs.

COUNTERSUNK HEAD STEEL RIVETS

Diameter and Length	Avg. Stock Kegs	Diameter and Length	Avg. Stock Kegs	Diameter and Length	Avg. Stock Kegs	Diameter and Length	Avg. Stock Kegs
1-2× 7/8	5	1-2×2½	6	3-4×1	3	3-4×3½	8
×1	5	5-8×1	4	×1¼	4	×4	10
×1⅛	8	×1¼	8	×1½	8	×4½	5
×1¼	6	×1½	5	×1¾	7	7-8×2	3
×1⅜	6	×1⅝	3	×2	9	×2¼	10
×1½	9	×1¾	6	×2¼	6	×2½	6
×1⅝	3	×2	9	×2½	6	×2¾	6
×1¾	5	×2¼	6	×2¾	5	×3	9
×2	3	×2½	5	×3	5	×3½	6
×2¼	3	×3	3	×3¼	4	×4	6

TINNERS' RIVETS OR POUND RIVETS

Size	Average Stock, Pounds		Size	Average Stock, Pounds		Size	Average Stock, Pounds	
	Flat Head and Pan Head, Black	Flat Head, Metallic Tinned		Flat Head and Pan Head, Black	Flat Head, Metallic Tinned		Flat Head and Pan Head, Black	Flat Head, Metallic Tinned
1 lb.	500	600	3 lb.	600	800	8 lb.	1500	1000
1½ "	500	500	4 "	1000	500	10 "	800	.....
1¾ "	.....	900	5 "	600	1000	12 "	1200	.....
2 "	800	1000	6 "	800	1000	14 "	900	.....
2½ "	500	800	7 "	800	1200	16 "	1000	.....

TANK AND SHEET RIVETS

CONE HEAD

Diameter and Length	Avg. Stock Lbs.	Diameter and Length	Avg. Stock Lbs.	Diameter and Length	Avg. Stock Lbs.	Diameter and Length	Avg. Stock Lbs.
1-4× 3/8	600	1-4×3	600	3-8× 7/8	3500	7-16× 5/8	1200
× 1/2	800	5-16× 1/2	500	×1	4000	× 3/4	1300
× 5/8	900	× 5/8	1200	×1⅛	3000	× 7/8	1000
× 3/4	600	× 3/4	1500	×1¼	1200	×1	1200
× 7/8	900	× 7/8	600	×1⅜	2000	×1⅛	900
×1	1800	×1	1500	×1½	900	×1¼	1400
×1⅛	700	×1⅛	600	×1⅝	900	×1⅜	2000
×1¼	1000	×1¼	900	×1¾	1500	×1½	2100
×1⅜	2000	×1⅜	1000	×1⅞	1600	×1⅝	600
×1½	1500	×1½	600	×2	900	×1¾	1200
×1⅝	1200	×1⅝	500	×2⅛	1200	×1⅞	1100
×1¾	900	×1¾	600	×2¼	800	×2	500
×2	800	×1⅞	1600	×2⅜	700	×2¼	500
×2¼	600	3-8× 1/2	1800	×2½	500	×2½	600
×2½	600	× 5/8	3000	×2¾	1100	×2¾	300
×2¾	700	× 3/4	2800	×3	600	×3	300

TANK AND SHEET RIVETS

CONTINUED

ROUND HEAD

Diameter and Length	Avg. Stock Lbs.	Diameter and Length	Avg. Stock Lbs.	Diameter and Length	Avg. Stock Lbs.	Diameter and Length	Avg. Stock Lbs.
3-16× 1/4	1700	1-4× 7/8	2400	5-16×1 3/8	2200	3-8×1 3/4	1700
× 3/8	2000	×1	1200	×1 1/2	2000	×2	1800
× 1/2	2200	×1 1/8	1000	×1 5/8	1600	×2 1/4	800
× 5/8	2400	×1 1/4	800	×1 3/4	900	×2 1/2	900
× 3/4	1900	×1 3/8	900	×1 7/8	900	×3	600
× 7/8	2000	×1 1/2	600	×2	700		
×1	1200	×2	700	×2 1/4	500	7-16× 5/8	1200
×1 1/8	600	×2 1/4	600	×2 1/2	600	× 3/4	1700
×1 1/4	900	×2 1/2	300	×3	300	× 7/8	2000
×1 3/8	500	×2 3/4	400			×1	2000
×1 1/2	1000	×3	400	3-8× 1/2	3500	×1 1/8	3200
×1 5/8	600			× 5/8	2800	×1 1/4	2700
×1 3/4	500	5-16× 3/8	1800	× 3/4	2600	×1 3/8	2100
×2	600	× 1/2	1500	× 7/8	2500	×1 1/2	2000
		× 5/8	1200	×1	2300	×1 3/4	1600
1-4× 5/16	900	× 3/4	1000	×1 1/8	2400	×2	1200
× 3/8	1000	× 7/8	6500	×1 1/4	3000	×2 1/4	900
× 1/2	1200	×1	5000	×1 3/8	1800	×2 1/2	900
× 5/8	2000	×1 1/8	2000	×1 1/2	2600	×2 3/4	600
× 3/4	2600	×1 1/4	1800	×1 5/8	2000	×3	800

PAN HEAD

Diameter and Length	Avg. Stock Lbs.	Diameter and Length	Avg. Stock Lbs.	Diameter and Length	Avg. Stock Lbs.	Diameter and Length	Avg. Stock Lbs.
1-4× 3/8	300	5-16× 7/8	900	3-8× 3/4	2000	7-16× 3/4	1300
× 1/2	1000	×1	300	× 7/8	2200	× 7/8	900
× 5/8	1200	×1 1/8	2000	×1	1800	×1	1500
× 3/4	900	×1 1/4	1800	×1 1/8	900	×1 1/8	1200
× 7/8	800	×1 3/8	1500	×1 1/4	1200	×1 1/4	1000
×1	1000	×1 1/2	2000	×1 3/8	900	×1 3/8	900
×2	900	×1 5/8	1500	×1 1/2	1600	×1 1/2	1200
		×1 3/4	600	×1 5/8	800	×2	900
5-16× 1/2	600			×1 3/4	1900		
× 5/8	1600	3-8× 1/2	600	×1 7/8	1500		
× 3/4	1200	× 5/8	1500	×2	900		

TANK AND SHEET RIVETS
CONTINUED

FLAT HEAD

Diameter and Length	Average Stock Pounds	Diameter and Length	Average Stock Pounds	Diameter and Length	Average Stock Pounds
3-16× 1/4	1000	1-4×1	1200	3-8× 1/2	600
× 3/8	900	×1 1/4	900	× 5/8	900
× 1/2	600	×1 1/2	1500	× 3/4	800
× 5/8	600	×2	600	× 7/8	1000
× 3/4	500			×1	900
× 7/8	900	5-16× 3/8	600	×1 1/8	500
×1	1300	× 1/2	900	×1 1/4	600
×1 1/4	900	× 5/8	2000	×1 3/8	800
×1 1/2	900	× 3/4	1200	×1 1/2	500
×2	900	× 7/8	1000	×1 5/8	1200
		×1	900	×1 3/4	600
1-4× 5/16	1000	×1 1/8	600	×1 7/8	500
× 3/8	600	×1 1/4	500	×2	500
× 1/2	1200	×1 3/8	1000	×2 1/4	300
× 5/8	800	×1 1/2	1200	×2 1/2	600
× 3/4	500	×1 5/8	1100		
× 7/8	1000	×1 3/4	1200		

COUNTERSUNK HEAD

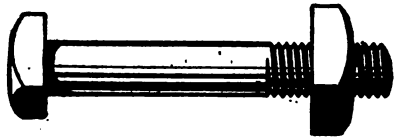
Diameter and Length	Average Stock Pounds	Diameter and Length	Average Stock Pounds	Diameter and Length	Average Stock Pounds
3-8× 1/2	600	3-8×1 1/8	900	3-8×1 3/4	600
× 5/8	1000	×1 1/4	1000	×1 7/8	500
× 3/4	1100	×1 3/8	800	×2	300
× 7/8	500	×1 1/2	500		
×1	600	×1 5/8	700		

WAGON BOX HEAD

Diameter and Length	Average Stock Pounds	Diameter and Length	Average Stock Pounds	Diameter and Length	Average Stock Pounds
3-16×1	600	3-16×2	300	1-4×1 1/2	1000
×1 1/4	600			×1 3/4	1200
×1 1/2	500	1-4×1	300	×2	500
×1 3/4	500	×1 1/4	900		

MACHINE BOLTS

WITH SQUARE HEADS, SQUARE NUTS AND FINISHED POINTS



MANUFACTURERS' STANDARD LIST. IN EFFECT AUGUST 1, 1912

PRICE PER 100

Length, Inches	Diameter										
	¼	5/16	⅜	7/16	½	9/16 and ⅝	¾	⅞	1	1⅛	1¼
¾-1½	$1.70	$2.00	$2.40	$ 2.80	$ 3.60	$ 5.20	$ 7.70	$10.50	$15.10	$22.50	$30.00
2	1.78	2.12	2.56	3.00	3.86	5.58	8.25	11.20	16.00	23.70	31.50
2½	1.86	2.24	2.72	3.20	4.12	5.96	8.80	11.90	16.90	24.90	33.00
3	1.94	2.36	2.88	3.40	4.38	6.34	9.35	12.60	17.80	26.10	34.50
3½	2.02	2.48	3.04	3.60	4.64	6.72	9.90	13.30	18.70	27.30	36.00
4	2.10	2.60	3.20	3.80	4.90	7.10	10.45	14.00	19.60	28.50	37.50
4½	2.18	2.72	3.36	4.00	5.16	7.48	11.00	14.70	20.50	29.70	39.00
5	2.26	2.84	3.52	4.20	5.42	7.86	11.55	15.40	21.40	30.90	40.50
5½	2.34	2.96	3.68	4.40	5.68	8.24	12.10	16.10	22.30	32.10	42.00
6	2.42	3.08	3.84	4.60	5.94	8.62	12.65	16.80	23.20	33.30	43.50
6½	2.50	3.20	4.00	4.80	6.20	9.00	13.20	17.50	24.10	34.50	45.00
7	2.58	3.32	4.16	5.00	6.46	9.38	13.75	18.20	25.00	35.70	46.50
7½	2.66	3.44	4.32	5.20	6.72	9.76	14.30	18.90	25.90	36.90	48.00
8	2.74	3.56	4.48	5.40	6.98	10.14	14.85	19.60	26.80	38.10	49.50
9	2.90	3.80	4.80	5.80	7.50	10.90	15.95	21.00	28.60	40.50	52.50
10	3.06	4.04	5.12	6.20	8.02	11.66	17.05	22.40	30.40	42.90	55.50
11	3.22	4.28	5.44	6.60	8.54	12.42	18.15	23.80	32.20	45.30	58.50
12	3.38	4.52	5.76	7.00	9.06	13.18	19.25	25.20	34.00	47.70	61.50
13	3.54	4.76	6.08	7.40	9.58	13.94	20.35	26.60	35.80	50.10	64.50
14	3.70	5.00	6.40	7.80	10.10	14.70	21.45	28.00	37.60	52.50	67.50
15	3.86	5.24	6.72	8.20	10.62	15.46	22.55	29.40	39.40	54.90	70.50
16	4.02	5.48	7.04	8.60	11.14	16.22	23.65	30.80	41.20	57.30	73.50
17	4.18	5.72	7.36	9.00	11.66	16.98	24.75	32.20	43.00	59.70	76.50
18	4.34	5.96	7.68	9.40	12.18	17.74	25.85	33.60	44.80	62.10	79.50
19	4.50	6.20	8.00	9.80	12.70	18.50	26.95	35.00	46.60	64.50	82.50
20	4.66	6.44	8.32	10.20	13.22	19.26	28.05	36.40	48.40	66.90	85.50
21	.....	.....	.....	.....	.....	.....	29.15	37.80	50.20	69.30	88.50
22	.....	.....	.....	.....	.....	.....	30.25	39.20	52.00	71.70	91.50
23	.....	.....	.....	.....	.....	.....	31.35	40.60	53.80	74.10	94.50
24	.....	.....	.....	.....	.....	.....	32.45	42.00	55.60	76.50	97.50
25	.....	.....	.....	.....	.....	.....	33.55	43.40	57.40	78.90	100.50
26	.....	.....	.....	.....	.....	.....	34.65	44.80	59.20	81.30	103.50
27	.....	.....	.....	.....	.....	.....	35.75	46.20	61.00	83.70	106.50
28	.....	.....	.....	.....	.....	.....	36.85	47.60	62.80	86.10	109.50
29	.....	.....	.....	.....	.....	.....	37.95	49.00	64.60	88.50	112.50
30	.....	.....	.....	.....	.....	.....	39.05	50.40	66.40	90.90	115.50
Advance per Inch	$0.16	$0.24	$0.32	$ 0.40	$ 0.52	$ 0.76	$ 1.16	$ 1.40	$ 1.80	$ 2.40	$ 3.00

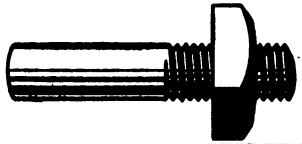
For weights, see page 912.

MACHINE BOLTS

The following extras are to be understood as a part of the list:
Bolts with Hexagon Heads or Hexagon Nuts, 10 per cent extra.
If both Hexagon Heads and Hexagon Nuts, 20 per cent extra.
Bolts with tee, askew and eccentric heads, 20 per cent extra.
Joint bolts with oblong nuts, 10 per cent extra.
Button and countersunk heads are sold from same list. Discount according to quantity.
Special bolts with irregular threads and unusual dimensions of heads or nuts will be charged extra at our discretion.

NET PRICES FOR EXTRA LENGTH OF THREADS AND EXTRA NUTS
LIST OF OCTOBER 1, 1899

Size of Bolt	¼	5/16	⅜	7/16	½	9/16 and 5/8	¾	⅞	1	1⅛	1¼
Extreme length of thread in inches..	¾	11/16	1⅛	1 1/16	1½	1⅞	2¼	2⅝	3	3⅜	3¾
For each additional ¼ inch of thread, per 100 bolts	$0.02	$0.02	$.02½	$0.03	$0.04	$0.06	$0.08	$0.10	$0.12	$0.14	$0.16
For one extra square nut, per 100 bolts.	.25	.35	.45	.55	.65	.85	1.35	2.00	3.00	4.15	5.75
For one extra Hexagon nut, per 100 bolts.....	.35	.45	.55	.70	.85	1.15	1.75	2.50	3.60	4.85	6.65
For one thumb or wing nut, in place of Hexagon or square, per 100 bolts.....	.40	.50	.60	.75	.90	.....					
Extra wing nuts....	.65	.85	1.05	1.30	1.55	.....					



BOLT ENDS

LIST OF OCTOBER 1, 1899

PRICE PER POUND

Size of Iron, Inches	Length, Inches	Price per Pound	Wt. lbs. per 100	Size of Iron, Inches	Length, Inches	Price per Pound	Wt. lbs. per 100
5/16	6	$0.20	15	1 3/8	15	$0.11	720
3/8	7	.18	22	1½	16	.11	940
7/16	7	.16	31	1 5/8	17	.12	1165
½	8	.14	45	1¾	18	.12	1405
5/8	9	.12	90	1⅞	19	.12	1800
¾	10	.10	140	2	20	.12	2045
⅞	11	.10	212	2¼	22	.14	3029
1	12	.10	310	2½	24	.14	4071
1⅛	13	.10	420	2¾	24	.16	4860
1¼	14	.11	550	3	26	.18	6354

With Hexagon Nuts, 10 per cent extra.
Bolt Ends ordered shorter than above standard lengths in lots of 100 and over, will be charged at the price per hundred of Machine Bolts of same length, subject to same discount; in smaller lots extra.
Special sizes and lengths can be furnished promptly.

CARRIAGE BOLTS

MANUFACTURERS' STANDARD LIST. NOVEMBER 1, 1912

SIZES AND LIST PRICE PER 100

Length, Inches	Diameter						
	¼	5/16	⅜	7/16	½	9/16 and ⅝	¾
1	$1.00	$1.40	$1.90	$2.20	.....	.....	.....
1½	1.00	1.40	1.90	2.20	.....	.....	.....
2	1.10	1.52	2.06	2.40	.....	.....	.....
2½	1.20	1.64	2.22	2.60	$3.25	$5.75	$8.50
3	1.30	1.76	2.38	2.80	3.53	6.13	9.00
3½	1.40	1.88	2.54	3.00	3.81	6.51	9.50
4	1.50	2.00	2.70	3.20	4.09	6.89	10.00
4½	1.60	2.12	2.86	3.40	4.37	7.27	10.50
5	1.70	2.24	3.02	3.60	4.65	7.65	11.00
5½	1.80	2.36	3.18	3.80	4.93	8.03	11.50
6	1.90	2.48	3.34	4.00	5.21	8.41	12.00
6½	2.00	2.60	3.50	4.20	5.49	8.79	12.50
7	2.10	2.72	3.66	4.40	5.77	9.17	13.00
7½	2.20	2.84	3.82	4.60	6.05	9.55	13.50
8	2.30	2.96	3.98	4.80	6.33	9.93	14.00
8½	2.40	3.08	4.14	5.00	6.61	10.31	14.50
9	2.50	3.20	4.30	5.20	6.89	10.69	15.00
9½	2.60	3.32	4.46	5.40	7.17	11.07	15.50
10	2.70	3.44	4.62	5.60	7.45	11.45	16.00
11	2.90	3.68	4.94	6.00	8.01	12.21	17.00
12	3.10	3.92	5.26	6.40	8.57	12.97	18.00
13	3.30	4.16	5.58	6.80	9.13	13.73	19.00
14	3.50	4.40	5.90	7.20	9.69	14.49	20.00
15	3.70	4.64	6.22	7.60	10.25	15.25	21.00
16	3.90	4.88	6.54	8.00	10.81	16.01	22.00
17	4.10	5.12	6.86	8.40	11.37	16.77	23.00
18	4.30	5.36	7.18	8.80	11.93	17.53	24.00
19	4.50	5.60	7.50	9.20	12.49	18.29	25.00
20	4.70	5.84	7.82	9.60	13.05	19.05	26.00
Advance per Inch	$0.20	$0.24	$0.32	$0.40	$0.56	$0.76	$1.00

Bolts with Hexagon Nuts, 15 per cent extra.
Intermediate lengths take next higher list.
Larger diameters take Machine Bolt list.

COACH AND LAG SCREWS

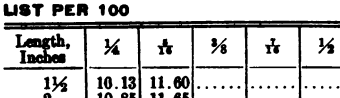
WITH SQUARE HEADS AND GIMLET POINTS

PRICE PER 100 — LIST OF NOVEMBER 12, 1908

Length, Inches	¼, 5/16	3/8	7/16	½	9/16, 5/8	¾	⅞	1
1½	$2.25	$2.70	$3.15	$3.75	.....	.....	.....	.....
2	2.45	2.96	3.47	4.11	$6.00	.....	.....	.....
2½	2.65	3.22	3.79	4.47	6.50	$9.20	.....	.....
3	2.85	3.48	4.11	4.83	7.00	9.90	$15.00	.....
3½	3.05	3.74	4.43	5.19	7.50	10.60	16.00	$22.00
4	3.25	4.00	4.75	5.55	8.00	11.30	17.00	23.30
4½	3.45	4.26	5.07	5.91	8.50	12.00	18.00	24.60
5	3.65	4.52	5.39	6.27	9.00	12.70	19.00	25.90
5½	3.85	4.78	5.71	6.63	9.50	13.40	20.00	27.20
6	4.05	5.04	6.03	6.99	10.00	14.10	21.00	28.50
6½	.....	.....	6.35	7.35	10.50	14.80	22.00	29.80
7	.....	.....	6.67	7.71	11.00	15.50	23.00	31.10
7½	.....	.....	6.99	8.07	11.50	16.20	24.00	32.40
8	.....	.....	7.31	8.43	12.00	16.90	25.00	33.70
9	.....	.....	7.95	9.15	13.00	18.30	27.00	36.30
10	.....	.....	.....	9.87	14.00	19.70	29.00	38.90
11	.....	.....	.....	10.59	15.00	21.10	31.00	41.50
12	.....	.....	.....	11.31	16.00	22.50	33.00	44.10
Advance per Inch.	$0.40	$0.52	$0.64	$ 0.72	$ 1.00	$ 1.40	$ 2.00	$ 2.60

Lag Screws with Hexagon Heads, 10 per cent extra. Tee Heads, 20 per cent extra. Skein Bolts are sold at the same List Price as Lag Screws. For weights see page 913.

EXPANSION BOLTS AND SHIELDS



LONG AND SHORT STANDARD

LIST PER 100 — EFFECTIVE JANUARY 1, 1911

Length, Inches	¼	5/16	3/8	7/16	½	5/8	¾	⅞	1	1¼
1½	10.13	11.60	.....	.....	.....	.....	.....	.....	.....	.....
2	10.85	11.65	.....	.....	.....	.....	.....	.....	.....	.....
2½	11.00	11.85	15.90	20.30	24.15	31.70	48.30	.....	.....	.....
3	11.25	12.00	16.10	20.50	24.45	32.10	48.85	.....	.....	.....
4	11.50	12.35	16.40	20.80	25.35	32.90	50.00	.....	.....	.....
5	11.85	12.65	16.90	21.15	25.90	33.75	51.05	.....	.....	.....
6	12.20	13.00	17.35	21.50	26.45	34.60	52.20	68.90	79.55	.....
7	.....	13.30	17.65	21.80	27.00	35.40	53.30	70.00	81.65	.....
8	.....	.....	18.00	22.15	27.55	36.25	54.45	71.10	83.70	174.45
9	.....	.....	.....	22.50	28.10	37.10	55.55	72.20	85.75	181.10
10	.....	.....	.....	.....	.....	37.95	56.65	73.30	87.75	187.75
11	.....	.....	.....	.....	.....	38.80	57.75	74.40	89.90	194.45
12	.....	.....	.....	.....	.....	39.60	58.90	75.55	92.00	201.10

In figuring lists for longer bolts than those given above, make same advance per inch as on list. Ten per cent extra for hexagon heads. Shields can also be furnished for machine and carriage bolts.

STOVE BOLTS

FLAT AND ROUND HEAD

LIST ADOPTED MARCH 1, 1907

PRICE PER 100

Length	Diameter, 1/4 and 5/16 Inch	Diameter, 3/8 Inch	Diameter, 7/16 and 1/2 Inch	Diameter, 5/8 Inch	Diameter, 3/4 Inch
3/8	$0.85	$0.85	.....	.....	.....
1/2	.85	.85	$1.20	.....	.....
5/8	.85	.85	1.20	.....	.....
3/4	.85	.85	1.20	$1.75	$2.65
7/8	.90	.90	1.25	1.80	2.70
1	.90	.90	1.30	1.85	2.75
1 1/8	.95	.95	1.35	1.90	2.85
1 1/4	1.00	1.00	1.40	1.95	2.90
1 3/8	1.05	1.05	1.45	2.00	3.00
1 1/2	1.10	1.10	1.50	2.05	3.10
1 3/4	1.15	1.15	1.55	2.15	3.20
2	1.20	1.20	1.60	2.30	3.40
2 1/4	.....	1.25	1.70	2.40	3.60
2 1/2	.....	1.30	1.80	2.50	3.80
2 3/4	.....	1.40	1.90	2.60	4.00
3	.....	1.50	2.00	2.70	4.20
3 1/4	.....	1.60	2.10	2.85	4.40
3 1/2	.....	1.70	2.20	3.00	4.60
3 3/4	.....	1.80	2.30	3.15	4.80
4	.....	1.90	2.40	3.30	5.00
4 1/4	.....	2.00	2.50	3.45	5.20
4 1/2	.....	2.10	2.60	3.60	5.40
4 3/4	.....	2.20	2.70	3.75	5.60
5	.....	2.30	2.85	3.90	5.80
5 1/4	.....	2.40	3.00	4.10	6.00
5 1/2	.....	2.50	3.15	4.30	6.20
5 3/4	.....	2.60	3.30	4.50	6.40
6	.....	2.75	3.45	4.70	6.60
6 1/4	.....	2.90	3.60	4.90	6.80
6 1/2	.....	3.05	3.75	5.10	7.00

PLOW BOLTS

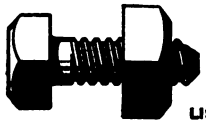
PRICE PER 100

Length, Inches	7/16 Inch	1/2 Inch	9/16 Inch	5/8 Inch	3/4 Inch	7/8 Inch
1¼	$1.70	$2.00	$2.60	$3.50	$4.50	$5.70
1½	1.80	2.10	2.75	3.70	4.75	6.00
1¾	1.90	2.20	2.90	3.90	5.00	6.30
2	2.00	2.30	3.05	4.10	5.25	6.60
2¼	2.10	2.40	3.20	4.30	5.50	6.90
2½	2.20	2.50	3.35	4.50	5.75	7.20
2¾	2.30	2.60	3.50	4.70	6.00	7.50
3	2.40	2.70	3.65	4.90	6.25	7.80
3¼	2.50	2.80	3.80	5.10	6.50	8.10
3½	2.60	2.90	3.95	5.30	6.75	8.40
3¾	2.70	3.00	4.10	5.50	7.00	8.70
4	2.80	3.10	4.25	5.70	7.25	9.00

Other styles can be furnished promptly from factory. In ordering Plow Bolts, please state what style heads are desired.

STEEL BOILER AND FITTING UP BOLTS

WITH CONE POINTS AND FITTED WITH HOT PRESSED SQUARE NUTS



PRICE PER 100 — LIST OF MARCH 19, 1907

Length	7/16	1/2	7/16 and 1/2	7/16 and 5/8	11/16 and 3/4	11/16 and 7/8	11/16 and 1	1 1/8	1 1/4
1½	$3.60	$4.30	$6.00	$ 9.00	$12.70	$18.80	$26.75	.....	.....
2	3.80	4.55	6.35	9.55	13.45	19.80	28.10	$41.50	.....
2½	4.00	4.80	6.70	10.10	14.20	20.80	29.45	43.25	$57.50
3	4.20	5.05	7.05	10.65	14.95	21.80	30.80	45.00	59.60
3½	4.40	5.30	7.40	11.20	15.70	22.80	32.15	46.75	61.70
4	4.60	5.55	7.75	11.75	16.45	23.80	33.50	48.50	63.80
4½	.....	.....	8.10	12.30	17.20	24.80	34.85	50.25	65.90
5	.....	.....	8.45	12.85	17.95	25.80	36.20	52.00	68.00

These bolts are made of soft steel with special coarse threads, so that the nuts can be run on or off quickly by hand, and will be found of great convenience to boilermakers, being much better adapted for "fitting up bolts" than the ordinary machine bolt.

COUPLING BOLTS

PRICE PER 100

Diameter of Head.	⅞	1 1/16	1¼	1 5/16	1⅝	1 13/16	2
Diameter of Bolt.	½	⅝	¾	⅞	1	1⅛	1¼
Length under Head to Extreme Point 2	$20.00	$25.00	.....	.....	.....	.....	.....
2¼	20.50	25.75	$32.00	.....	.....	.....	.....
2½	21.00	26.50	32.00	$38.75	.....	.....	.....
2¾	21.50	27.25	33.00	39.75	$56.00	.....	.....
3	22.00	28.00	34.00	40.75	56.00	$70.00	.....
3¼	22.50	28.75	35.00	41.75	57.00	71.50	$100.00
3½	23.00	29.50	36.00	42.75	58.00	73.00	100.00
3¾	23.50	30.25	37.00	43.75	59.00	74.50	102.50
4	24.00	31.00	38.00	44.75	60.00	76.00	105.00
4¼	24.50	31.75	39.00	45.75	61.00	77.50	107.50
4½	25.00	32.50	40.00	46.75	62.00	79.00	110.00
4¾	25.50	33.25	41.00	47.75	63.00	80.50	112.50
5	26.00	34.00	42.00	48.75	64.00	82.00	115.00
5¼	26.50	34.75	43.00	49.75	65.00	83.50	117.50
5½	27.00	35.50	44.00	50.75	66.00	85.00	120.00
5¾	27.50	36.25	45.00	51.75	67.00	86.50	122.50
6	28.00	37.00	46.00	52.75	68.00	88.00	125.00
Thickness of Nut.	½	⅝	¾	⅞	1	1⅛	1¼
Short Diameter of Nut.....	⅞	1 1/16	1¼	1 5/16	1⅝	1 13/16	2

Coupling bolts have milled bodies, and the heads and nuts are faced true with the body.

All orders are filled with U. S. Standard thread unless otherwise specified.

BRIDGE AND ROOF BOLTS

DIMENSIONS OF UPSET ENDS FOR ROUND RODS

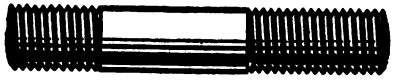
Diameter of Bar, Inches	Diameter of Upset, Inches	Length of Upset, Inches	Threads per Inch	Diameter of Bar, Inches	Diameter of Upset, Inches	Length of Upset, Inches	Threads per Inch
¾	1	3½	8	1⅜	1⅝	5	5½
⅞	1⅛	4	7	1⅜	1¾	5	5
⅞	1¼	4	7	1½	1¾	5	5
1	1¼	4	7	1½	1⅞	5	5
1	1⅜	4	6	1½	2	4½	4½
1⅛	1¼	4½	7	1⅝	2⅛	5	4½
1⅛	1⅜	4½	6	1¾	2	5½	4½
1¼	1½	4½	6	1¾	2⅛	5	4½
1¼	1⅝	4	5½	1¾	2¼	5	4½
1¼	1¾	4	5	1⅞	2¼	5½	4½

BRIDGE AND ROOF BOLTS
CONTINUED

Diameter of Bar, Inches	Diameter of Upset, Inches	Length of Upset, Inches	Threads per Inch	Diameter of Bar, Inches	Diameter of Upset, Inches	Length of Upset, Inches	Threads per Inch
1⅞	2⅜	5	4	2⅜	2¾	6	4
2	2¼	6	4½	2⅜	3	5½	3½
2	2⅜	6	4	2½	3	6	3½
2	2½	5½	4	2½	3⅛	5½	3½
2⅛	2½	6	4	2⅝	3¼	6	3½
2⅛	2⅝	5½	4	2¾	3⅜	6	3½
2¼	2½	6	4	2⅞	3⅝	6	3¼
2¼	2¾	6	4	3	3¾	6	3
2¼	2⅞	5½	4				

Rods with special size and length of upset, made to order.

MILLED IRON STUDS



PRICE PER 100

Length of Studs	Diameter....	⅛	1/16	⅙	5/16	⅜	⅞	1	1⅛	1¼
	1¼	$3.35	$4.05	$4.40	$5.10	.....	.....	.....	.....	.....
	1½	3.50	4.20	4.60	5.30	$6.10	.....	.....	.....	.....
	1¾	3.65	4.35	4.80	5.50	6.30	.....	.....	.....	.....
	2	3.80	4.50	5.00	5.70	6.50	$8.80	.....	.....	.....
	2¼	3.95	4.65	5.20	5.90	6.70	9.10	.....	.....	.....
	2½	4.10	4.80	5.40	6.10	6.90	9.40	$12.00	.....	.....
	2¾	4.25	4.95	5.60	6.30	7.10	9.70	12.50	.....	.....
	3	4.40	5.10	5.80	6.50	7.30	10.00	13.00	$17.00	$21.00
	3¼	.....	5.25	6.00	6.70	7.50	10.30	13.50	17.75	22.00
	3½	.....	5.40	6.20	6.90	7.70	10.60	14.00	18.50	23.00
	3¾	.....	5.55	6.40	7.10	7.90	10.90	14.50	19.25	24.00
	4	.....	5.75	6.60	7.30	8.10	11.20	15.00	20.00	25.00
	4¼	.....	.....	6.70	7.40	8.25	11.45	15.40	20.50	25.75
	4½	.....	.....	6.80	7.50	8.40	11.65	15.75	21.00	26.50
	4¾	.....	.....	7.00	7.60	8.55	11.90	16.15	21.50	27.25
	5	.....	.....	7.20	7.70	8.70	12.10	16.50	22.00	28.00
	5¼	.....	.....	.....	7.80	8.85	12.35	16.90	22.50	28.75
	5½	.....	.....	.....	.....	9.00	12.55	17.25	23.00	29.50
	5¾	.....	.....	.....	.....	9.15	12.80	17.65	23.50	30.25
	6	.....	.....	.....	.....	9.30	13.00	18.00	24.00	31.00
	Threads to Inch.....	16	14	12	12	11	10	9	8	7	7
	Add for each ¼ inch....	$0.15	$0.20	$0.20	$0.20	$0.25	$0.30	$0.40	$0.60	$0.75	$1.00

Studs carried in stock with V threads only.

All studs are made steam tight on tap end unless otherwise specified.

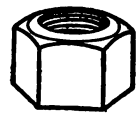
Steel studs take 25 per cent advance over iron.

Rough studs can be furnished to order.

HOT PRESSED SQUARE AND HEXAGON NUTS

UNITED STATES STANDARD LIST

AMENDED DECEMBER 20, 1906
TO TAKE EFFECT JANUARY 1, 1906



Short Diameter	Thickness	Hole	Size of Bolt	Price per 100 Pounds			
				Square		Hexagon	
				Blank	Tapped	Blank	Tapped
1/2	1/4	5/16 scant	1/4	$13.00	$15.00	$20.00	$22.50
9/16	5/16	1/4 scant	5/16	12.00	13.50	18.00	20.00
11/16	5/16	11/32 scant	5/16	10.50	11.60	14.00	15.60
11/16	7/16	11/32 scant	7/16	10.00	10.90	13.00	14.30
7/8	1/2	13/32 scant	1/2	9.00	9.70	11.20	12.20
11/16	9/16	11/32	9/16	9.00	9.60	11.20	12.10
1 1/16	5/8	11/32	5/8	8.70	9.20	10.50	11.20
1 1/4	3/4	5/8 scant	3/4	8.50	8.90	10.00	10.60
1 7/16	7/8	41/64 scant	7/8	8.40	8.80	9.90	10.50
1 5/8	1	27/32 scant	1	8.40	8.80	9.90	10.50
1 13/16	1 1/8	13/16 full	1 1/8	8.40	8.80	9.90	10.50
2	1 1/4	1 1/16 full	1 1/4	8.40	8.80	9.90	10.50
2 3/16	1 3/8	1 5/32 full	1 3/8	8.50	9.00	10.00	10.70
2 3/8	1 1/2	1 9/32 full	1 1/2	8.80	9.40	10.30	11.10
2 5/16	1 5/8	1 11/32 scant	1 5/8	9.00	9.70	10.50	11.40
2 3/4	1 3/4	1 1/2 scant	1 3/4	9.30	10.00	10.80	11.70
2 11/16	1 7/8	1 5/8 scant	1 7/8	9.50	10.30	11.00	12.00
3 1/8	2	1 23/32 scant	2	9.70	10.60	11.20	12.30
3 5/16	2 1/8	1 27/32 scant	2 1/8	10.00	11.00	11.70	12.90
3 1/2	2 1/4	1 31/32 scant	2 1/4	10.00	11.10	11.70	13.00
3 11/16	2 3/8	2 1/16	2 3/8	10.30	11.50	12.20	13.60
3 7/8	2 1/2	2 3/16	2 1/2	10.50	11.80	12.40	13.90
4 1/4	2 3/4	2 5/8	2 3/4	11.00	12.40	13.00	14.60
4 5/8	3	2 5/8	3	11.50	13.00	13.50	15.20

For less than keg lots (200 pounds) of a size, add 20 cents per cwt. for 100 pounds or over.

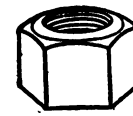
For less than keg lots (200 pounds) of a size, add 50 cents per cwt. for less than 100 pounds.

For weights, see page 913.

HOT PRESSED SQUARE AND HEXAGON NUTS WITH ENLARGED HOLES

UNITED STATES STANDARD LIST

AMENDED DECEMBER 20, 1906
TO TAKE EFFECT JANUARY 1, 1906



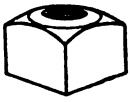
Short Diameter	Thickness	Hole	Size of Bolt	Price per 100 Pounds			
				Square		Hexagon	
				Blank	Tapped	Blank	Tapped
1/2	1/4	7/32	1/4	$13.00	$15.00	$20.00	$22.50
19/32	5/16	9/32	5/16	12.10	13.60	18.15	20.15
11/16	3/8	21/64	3/8	10.70	11.80	14.00	15.60
23/32	7/16	3/8	7/16	10.00	10.90	13.00	14.30
7/8	1/2	7/16	1/2	9.00	9.70	11.20	12.20
31/32	9/16	31/64	9/16	9.10	9.70	11.35	12.25
1 1/16	5/8	9/16	5/8	8.80	9.30	10.65	11.35
1 1/4	3/4	21/32	3/4	8.60	9.00	10.10	10.70
1 7/16	7/8	41/64	7/8	8.50	8.90	10.05	10.65
1 5/8	1	7/8	1	8.50	8.90	9.90	10.50
1 13/16	1 1/8	1 1/32	1 1/8	8.50	8.90	10.05	10.65
2	1 1/4	1 3/32	1 1/4	8.50	8.90	10.05	10.65
2 3/16	1 3/8	1 5/16	1 3/8	8.60	9.10	10.15	10.85
2 3/8	1 1/2	1 5/16	1 1/2	8.90	9.50	10.45	11.25
2 9/16	1 5/8	1 7/16	1 5/8	9.10	9.80	10.65	11.55
2 3/4	1 3/4	1 17/32	1 3/4	9.40	10.10	10.95	11.85
2 15/16	1 7/8	1 21/32	1 7/8	9.60	10.40	11.15	12.15
3 1/8	2	1 3/4	2	9.80	10.70	11.35	12.45
3 5/16	2 1/8	1 27/32	2 1/8	10.10	11.10	11.85	13.05
3 1/2	2 1/4	1 31/32	2 1/4	10.10	11.20	11.85	13.15
3 11/16	2 3/8	2 3/32	2 3/8	10.40	11.60	12.35	13.75
3 7/8	2 1/2	2 13/64	2 1/2	10.60	11.90	12.55	14.05
4 1/4	2 3/4	2 27/64	2 3/4	11.10	12.50	13.15	14.75
4 5/8	3	2 11/32	3	11.60	13.10	13.65	15.35

For less than keg lots (200 pounds) of a size, add 20 cents per cwt. for 100 pounds or over.

For less than keg lots (200 pounds) of a size, add 50 cents per cwt. for less than 100 pounds.

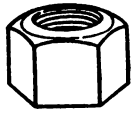
For weights, see page 913.

COLD-PUNCHED, CHAMFERED AND TRIMMED NUTS WITH REAMED HOLES



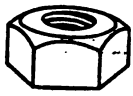
UNITED STATES STANDARD LIST

ASSOCIATION STANDARD LIST, OF JANUARY 1, 1906



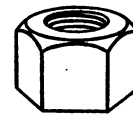
Width, Inches	Thick, Inches	Hole, Inches	Bolt, Inches	Price per Pound in 200-pound Kegs			
				Square		Hexagon	
				Blank	Tapped	Blank	Tapped
1/2	1/4	3/16	1/4	$0.20	$0.22	$0.27	$0.295
17/32	5/16	1/4	5/16	.18	.195	.24	.26
11/16	3/8	25/64	3/8	.145	.156	.185	.201
23/32	7/16	11/32	7/16	.14	.149	.18	.193
7/8	1/2	13/32	1/2	.113	.12	.14	.15
31/32	9/16	29/64	9/16	.113	.119	.14	.149
1 1/16	5/8	33/64	5/8	.10	.105	.125	.132
1 1/4	3/4	5/8	3/4	.97	.101	.114	.12
1 7/16	7/8	41/64	7/8	.96	.10	.111	.117
1 5/8	1	27/32	1	.96	.10	.111	.117
1 13/16	1 1/8	15/16	1 1/8	.96	.10	.111	.117
2	1 1/4	1 1/16	1 1/4	.101	.105	.115	.121
2 3/16	1 3/8	1 3/32	1 3/8	.103	.108	.12	.127
2 3/8	1 1/2	1 9/32	1 1/2	.107	.113	.126	.134
2 9/16	1 5/8	1 13/32	1 5/8	.111	.118	.132	.141
2 3/4	1 3/4	1 1/2	1 3/4	.115	.122	.14	.149
2 15/16	1 7/8	1 5/8	1 7/8	.12	.128	.145	.155
3 1/8	2	1 23/32	2	.12	.129	.145	.156
3 5/16	2 1/8	1 13/16	2 1/8	.125	.135	.15	.162
3 1/2	2 1/4	1 15/16	2 1/4	.125	.136	.15	.163
3 11/16	2 3/8	2 1/16	2 3/8	.135	.147	.16	.174
3 7/8	2 1/2	2 3/16	2 1/2	.135	.148	.16	.175
4 1/16	2 5/8	2 5/16	2 5/8	.14	.154	.165	.181
4 1/4	2 3/4	2 7/16	2 3/4	.14	.154	.165	.181
4 5/8	3	2 5/8	3	.145	.16	.17	.187
5	3 1/4	2 13/16	3 1/4	.145	.161	.17	.188
5 3/8	3 1/2	3 3/32	3 1/2	.145	.162	.17	.189
6 1/8	4	3 5/16	4	.155	.175	.18	.20

FINISHED, CASE-HARDENED AND SEMI-FINISHED HEXAGON NUTS AND CHECK AND JAM NUTS



REVISED LIST, ADOPTED MAY 6, 1911

PRICE PER 100



Size of Bolt	Width	Thickness		Number of Threads	Semi-Finished	Semi-Finished With Double Chamfer	Finished Case Hardened Nuts	Finished Case Hardened Nuts With Double Chamfer
		Regular	Check Jam					
3/16	3/8	3/16	5/32	24	$ 2.00	$ 2.50	$ 6.00	$ 6.50
1/4	1/2	1/4	5/16	20	2.00	2.50	6.00	6.50
5/16	19/32	5/16	7/32	18	2.50	2.75	7.00	7.50
3/8	11/16	3/8	1/4	16	3.25	4.00	8.00	8.75
7/16	25/32	7/16	5/16	14	3.75	4.75	9.00	10.00
1/2	7/8	1/2	5/16	13 or 12	4.50	5.50	10.00	11.00
9/16	31/32	9/16	11/32	12	5.50	6.50	12.00	13.00
5/8	1 1/16	5/8	3/8	11	6.50	7.50	16.00	17.50
11/16	1 5/32	11/16	13/32	11	8.50	10.50	22.00	24.00
3/4	1 1/4	3/4	7/16	10	8.50	10.50	22.00	24.00
7/8	1 7/16	7/8	1/2	9	12.00	14.50	27.00	29.50
1	1 5/8	1	9/16	8	17.50	21.00	38.00	41.50
1 1/8	1 13/16	1 1/8	5/8	7	24.00	28.50	50.00	54.50
1 1/4	2	1 1/4	3/4	7	33.00	39.00	66.00	72.00
1 3/8	2 3/16	1 3/8	13/16	6	49.00	57.00	90.00	97.00
1 1/2	2 3/8	1 1/2	7/8	6	69.00	78.00	120.00	130.00
1 5/8	2 9/16	1 5/8	15/16	5 1/2	93.00	105.00	145.00	158.00
1 3/4	2 3/4	1 3/4	1	5	130.00	145.00	175.00	190.00
1 7/8	2 15/16	1 7/8	1 1/16	5	170.00	190.00	250.00	270.00
2	3 1/8	2	1 1/8	4 1/2	215.00	240.00	325.00	350.00
2 1/4	3 1/2	2 1/4	1 1/4	4 1/2	310.00	345.00	550.00	600.00
2 1/2	3 7/8	2 1/2	1 1/2	4	475.00	525.00	850.00	950.00
2 3/4	4 1/4	2 3/4	1 3/4	4	630.00	695.00	1200.00	1350.00
3	4 5/8	3	2	3 1/2	990.00	1100.00	1800.00	2000.00

Nuts finished top and bottom, use double chamfered list.

For nuts thinner or smaller than standard, use regular list.

For semi-finished nuts case-hardened, add 20 per cent to the list, and use double chamfered list if rounded on top.

For finished nuts not case-hardened, use regular list.

For nuts polished after case-hardened, add 30 per cent to the list.

TURNBUCKLES

SIZES CARRIED IN STOCK

Size, Inches	List Price	Length without Stubs, Inches	Length including Stubs, Inches	Approximate with Stub Ends, Pounds	Approximate without Stub Ends, Pounds
5/16	$0.38	7 1/4	22	1	.65
3/8	.40	7 1/4	22	1.15	.65
7/16	.42	7 5/16	22	1.25	.65
1/2	.45	7 1/2	22	2	1.2
9/16	.48	7 11/16	22	2.25	1.2
5/8	.50	7 7/8	22	3	1.6
3/4	.63	8 1/4	23	4	2.2
7/8	.75	8 5/8	24	5.25	2.4
1	.88	9	25	7	3.2
1 1/8	1.00	9 3/8	25	8.75	3.6
1 1/4	1.25	9 3/4	26	11.75	4.8
1 3/8	1.38	10 1/8	27	14.12	6
1 1/2	1.50	10 1/2	27	17	7.2
1 5/8	1.75	10 7/8	28	20	8
1 3/4	2.00	11 1/4	28	23.25	9
1 7/8	2.25	11 5/8	29	27.75	10.8
2	2.65	12	29	36	17
2 1/8	3.10	12 3/8	29	37.75	17
2 1/4	3.50	12 5/8	30	45	19.2
2 3/8	4.00	12 7/8	31	48	19.2
2 1/2	4.50	13 1/2	32	61	27.5
2 5/8	5.00	13 7/8	32	62	26.3
2 3/4	5.50	14 1/4	33	77	35
2 7/8	6.00	14 5/8	33	80	35
3	6.50	15	34	83	35

The above turnbuckles have right and left U. S. Standard threads. The opening between the heads measures 5½ inches clear.

Turnbuckles without stub ends or with special openings can be furnished promptly from the factory.

PIPE, TANK AND SILO BANDS

Bands are furnished with rolled or cut threads, and any style of head, nut and washer.

Standard Pipe Bands have special round heads, rolled threads, square nuts and cut washers. The head and the rolled thread are of greater strength than any other part of the band.

Bands are furnished of diameters ¼ inch to 1⅛ inch, and lengths up to 32 feet, straight or curved as required, and uncoated or coated with hot or cold paint as specified.

MALLEABLE IRON PIPE SHOES FOR WOOD STAVE PIPE, TANKS, ETC.

No. 1

No. 2

No. 3

Diameter of Band, Inches	Outside Diameter of Pipe, Inches	Approximate Weight per Shoe in Pounds			Diameter of Band, Inches	Outside Diameter of Pipe, Inches	Approximate Weight per Shoe in Pounds		
		Style No. 1	Style No. 2	Style No. 3			Style No. 1	Style No. 2	Style No. 3
5/16	9	.....	0.25	.....	5/8	51	1.25	.....	.....
3/8	12	0.50	0.42	0.55	5/8	55	.....	1.60	1.85
3/8	17	.....	0.50	0.66	5/8	63	1.35	.....	.....
3/8	24	.....	.....	0.75	5/8	65	.....	1.80	2.25
7/16	22	0.75	.....	.....	5/8	75	.....	1.90	.....
1/2	22	.....	0.85	.....	5/8	93	.....	2.25	.....
1/2	30	.....	0.90	.....	3/4	75	.....	2.10	2.60
1/2	32	0.95	.....	1.00	3/4	78	1.75	.....	.....
1/2	38	.....	0.95	.....	3/4	85	.....	.....	3.00
1/2	42	.....	.....	1.25	3/4	94	2.25	.....	.....
1/2	46	1.00	1.00	.....	7/8	85	.....	2.25	.....
1/2	52	.....	.....	1.30	7/8	96	.....	.....	3.50
1/2	59	.....	1.10	.....	7/8	114	3.66	.....	.....
5/8	35	.....	.....	1.00	7/8	120	.....	.....	4.40
5/8	45	.....	.....	1.50	7/8	144	.....	.....	5.25

Shoes for pipe of diameters given will fit diameters 1 inch greater or less for diameter 9 inches; 2 inches greater for 12 inches; 3 inches greater for 17 inches; 4 inches greater for 24 inches to 50 inches; 5 inches greater for 50 inches to 90 inches and 6 inches greater for over 90 inches.

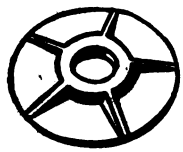
Patterns for standard types of shoes not above listed are added as occasion requires. A stock of uncoated shoes of standard sizes is carried at the foundry. Any coating desired can be applied to the shoes before shipment.

CAST IRON WASHERS

IN STOCK

Bolt, Inches	Hole, Inches	Diameter, Inches	Thickness, Inches	Approximate Weight	Bolt, Inches	Hole, Inches	Diameter, Inches	Thickness, Inches	Approximate Weight
1/2	5/8	2 5/8	11/16	9 oz.	1 1/8	1 1/4	4 1/2	1 1/8	2 lbs. 8 oz.
5/8	3/4	2 3/4	3/4	12 oz.	1 1/4	1 3/8	5 1/2	1 3/16	4 lbs. 4 oz.
3/4	7/8	3 1/8	7/8	1 lb.	1 3/8	1 1/2	5 1/2	1 1/4	4 lbs. 6 oz.
7/8	1	3 1/2	15/16	1 lb. 6 oz.	1 1/2	1 5/8	6	1 1/4	5 lbs. 8 oz.
1	1 1/8	4 1/8	1	2 lbs.					

MALLEABLE IRON WASHERS



These washers are made of refined malleable iron and are practically indestructible.

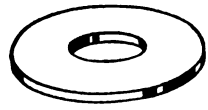
IN STOCK

Size of Bolt, Inches	Diameter, Inches	Thickness, Inches	Approximate Weight per 100	Size of Bolt, Inches	Diameter, Inches	Thickness, Inches	Approximate Weight per 100
1/2	2 1/2	1/4	15	1 1/8	4 1/2	1/2	87
5/8	2 3/4	5/16	22	1 1/4	5	5/8	150
3/4	3	7/16	33	1 1/2	6	3/4	190
7/8	3 1/2	7/16	50	1 3/4	6	3/4	206
1	4	1/2	68	2	7 1/2	3/4	420

STAR WASHERS

Star washers to meet all requirements can be furnished promptly from stock.

STANDARD WROUGHT WASHERS



ADOPTED JANUARY 20, 1910

U. S. STANDARD SIZES — IN 200 POUND KEGS

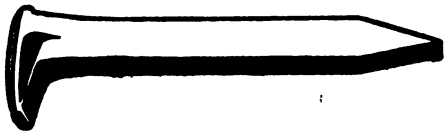
IN STOCK

Diameter	Size of Hole	Thickness Wire Gauge	Size of Bolt	Price per 100 Pounds	Number in 100 Pounds
9/16	1/4	18	3/16	$14.00	39400
3/4	5/16	16	1/4	12.20	15600
7/8	3/8	16	5/16	11.40	11250
1	7/16	14	3/8	10.50	6800
1 1/4	1/2	14	7/16	9.80	4300
1 3/8	9/16	12	1/2	9.40	2600
1 1/2	5/8	12	9/16	9.30	2250
1 3/4	11/16	10	5/8	9.20	1300
2	13/16	10	3/4	9.10	1010
2 1/4	15/16	9	7/8	9.00	860
2 1/2	1 1/16	9	1	9.00	625
2 3/4	1 1/4	9	1 1/8	9.00	520
3	1 3/8	9	1 1/4	9.20	400
3 1/4	1 1/2	8	1 3/8	9.20	300
3 1/2	1 5/8	8	1 1/2	9.20	280
3 3/4	1 3/4	8	1 5/8	9.50	240
4	1 7/8	8	1 3/4	9.50	215
4 1/4	2	8	1 7/8	9.50	190
4 1/2	2 1/8	8	2	9.50	175
4 3/4	2 3/8	5	2 1/4	10.50	122
5	2 5/8	4	2 1/2	10.50	106

Add $0.10 cwt. for 100 pound kegs.
Add .20 cwt. for 50 to 100 pound boxes.
Add .30 cwt. for 25 to 50 pound boxes.
Add .50 for 5 pound boxes.
Add 1.00 cwt. for 1 pound boxes.

TRACK SPIKES AND BOLTS

IN STOCK



ADVANCES ON SQUARE BOAT SPIKES

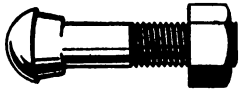
¼ inch square, 3 to 3½ inches long	Per 100 lbs.	$1.00
¼ inch square, 4 to 8 inches long	"	.75
5/16 inch square, 3½	"	.70
5/16 inch square, 4 to 8 inches long	"	.45
⅜ inch square, 3 to 3½ inches long	"	.55
⅜ inch square, 4 to 12 inches long	"	.30
7/16 inch square, 6 to 12 inches long	"	.20
½ inch square, 6 to 12 inches long	"	.15
⅝ inch square, 8 to 14 inches long	"	.15

REVERSED POINTS: ¼ cent per pound extra.

ADVANCES ON RAILROAD AND SHIMMING SPIKES

¼ inch square, 2 to 2½ inches long	Per 100 lbs.	$1.00
¼ inch square, 3 inches long	"	.85
5/16 inch square, 2 inches long	"	.80
5/16 inch square, 2½ to 4 inches long	"	.60
⅜ inch square, 2 inches long	"	.50
⅜ inch square, 2½ inches long	"	.40
⅜ inch square, 3 to 4½ inches long	"	.30
7/16 inch square, 3 inches long	"	.30
7/16 inch square, 3½ to 4½ inches long	"	.20
½ inch square, 2½ inches long	"	.20
½ inch square, 3 to 5 inches long	"	.10
9/16 inch square, 4½ to 5½ inches long	"	Base

REVERSED POINTS: ¼ cent per pound extra.



STANDARD EXTRAS ON TRACK BOLTS

Extras are given in cents per 100 lbs.

Diameter	¼ to 1 1/8 Inches		⅝ Inch	
Length	Square Nuts	Hexagon Nuts	Square Nuts	Hexagon Nuts
3½ to 12 inches	Base	$0.15	$0.20	$0.50
3¼ inches	$0.05	.20	.30	.60
3 inches	.15	.30	.40	.70

THIS section is incomplete on account of our desire to condense this book to a serviceable pocket size, and consequently covers only the more important of our miscellaneous stock items. Additional data, prices and descriptive matter on these lines and other material and fittings will be forwarded promptly on request.

Special Service Departments

In order to justify our trade in looking to us for prompt, efficient service at low prices on odd or irregular items we have created special facilities for the execution of these orders at two points—the Miscellaneous Work Order and the City Buy Departments.

Through the Miscellaneous Work Order and its specialists we secure accurate execution, prompt service and expert inspection on a great number and variety of orders for semi-finished material, such as special forming, forging and flanging, orders for threaded rods, special bolts, etc. On these orders, men specially trained take full responsibility for the carrying out of special changes on standard material to meet customers' individual requirements.

Our City Buy, through its special teaming service and transfer station, effectively combines the customer's order in a single shipment, even though many items in other lines than our own may be required. With pick-ups averaging over one hundred a day, City Buy maintains, as a courtesy to our regular trade, another special service which saves freight, cartage, time and annoyance that would be caused by scattered purchases. The latest current prices prevail.

These two special departments added to our well-known warehouse Steel-Service have been the reason for the trade's acceptance of the phrase, "Send it to Ryerson's; if it's to be had, you will get it quickly."

6—UNCLASSIFIED STOCK LINES

	Page
Glyco Babbitt Metal	601
Chain	603
Marking Crayons	603
Round Wire	604
Nails	604
Wire Cloth	605
Expanded Metal and Lath	606
Wire Screen	606
Perforated Steel Sheets and Plates	607
Wire Rope, Fittings and Fastenings	608
Turnbuckles, Hook and Eye	608
Gaskets	608

PAGES 000 TO 000

ASSOCIATED SUBJECTS

	Section
Turnbuckles, Stub End	§ 5
Galvanized Roofing Nails	§ 3
Boiler Joint Cement	§ 4
Small Tools	§ 7
Column Brackets	§11
Joist Hangers	§11
Bases for Columns	§11
Joist Anchors	§11

Complete Alphabetical Index will be found on last four pages of the book.

GLYCO BABBITT METAL

THE INVENTOR of Glyco Metal is John Edward Stead, Esq., noted English Metallurgist (member of the Council of the Iron and Steel Institute; Bessemer Medalist, F. R. S., F. I. C., F. C. S., etc.), who found a way to produce, in Glyco, an alloy having the greatest possible homogeneity of texture (in appearance like fine tool steel) and an unvarying uniformity.

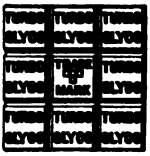
THE COMPOSITION AND PROCESS of preparation of Glyco are peculiar and unique, and produce a special and quasi-chemical combination of uniform texture, having those indispensable qualities which no other lead base alloy has ever been able to secure.

GLYCO HAS THE GREATEST POSSIBLE homogeneity of texture and uniformity of quality, and these properties, demanded in a good bearing metal, are guaranteed, and are due to the following features: (1) To the special and unique process of manufacture, the discovery of the inventor. (2) To the employment of only pure raw metals. (3) To the absolutely scientific combination of the component elements and the constant employment of special testing apparatus to secure uniform results.

GENUINE GLYCO BABBITT METAL is cast in ingots exactly as illustrated. It is securely packed in boxes of the following net weights: 10 pounds, 25 pounds, 50 pounds, 100 pounds and 500 pounds.

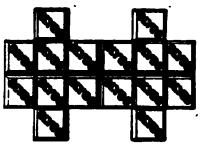
GLYCO BABBITT METAL

MADE IN FOUR GRADES

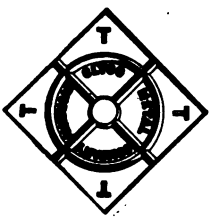


TURBO GLYCO (nickel-hardened) is the latest Glyco product to be put on the market in this country. It has proved remarkably successful as a bearing liner under the most trying conditions of service.

MARINE GLYCO is intended for use where the service is severe and where a high grade bearing metal is desirable. Large tonnages used in electric motor bearings.



STANDARD GLYCO is recommended for an infinite variety of ordinary conditions of service, and is used in large quantities for general repair purposes.



TRANSMISSION GLYCO is recommended for use where the conditions of service are unimportant and the requirements necessitate a low priced metal.

WE RECOMMEND Turbo and Marine Glyco as substitutes for so-called genuine Babbitt.

Send for Technical Library, Vol. 13, on Bearing Metals.

CHAIN

IN STOCK

We can furnish immediately from stock all staple sizes of chain, including common BB, BBB, and log chains. Also common twist link chain in sizes $\frac{3}{16}$ inch to $\frac{3}{8}$ inch, inclusive.

We are prepared to supply on very short notice special chain of every description such as railroad wrecking, switch, and brake chains, sling chains, agricultural chains, etc.

Our factory makes a specialty of the highest grade of hand welded chain for steam shovel and dredge work.

CHAIN TABLE

Size Chain, Inches	Proof Coil		B. B.			B. B. B.		
	Number Links per Foot	Approximate Weight 100 Feet	Number Links per Foot	Approximate Weight 100 Feet	Proof Test	Number Links per Foot	Approximate Weight 100 Feet	Proof Test
$\frac{3}{16}$	13½	46	14½	50	1100	15	52	1200
¼	12½	75	13½	80	1650	14	83	1750
$\frac{5}{16}$	11	110	12	115	3000	12½	118	3400
$\frac{3}{8}$	10	155	11	160	4000	11½	166	4500
$\frac{7}{16}$	9	200	9½	210	5500	10	215	6300
½	8	260	8½	265	7000	9	268	8000
$\frac{9}{16}$	7½	325	8	335	8800	8¼	340	10000
$\frac{5}{8}$	6½	420	7	425	10750	7¼	430	12500
¾	6	590	6¼	600	15500	6½	610	17750
$\frac{7}{8}$	5	800	5¼	820	21000	5½	830	24000
1	4	1000	4¼	1030	28500	4½	1040	31350
1⅛	3¾	1300	4	1350	36000	4⅛	1400	38000
1¼	3⅜	1500	3½	1550	43000	3⅝	1600	47000

Safe working load, one-half the proof test. Breaking strain, approximately twice the proof test.

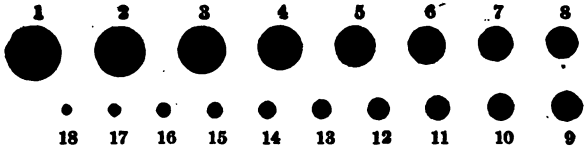
NANTAHALA
METAL WORKERS' MARKING CRAYONS

Our crayon is a mined product, and is far superior to the manufactured soapstone crayons. We believe that it is undoubtedly the best on the market. We carry in stock, for immediate shipment, $\frac{1}{16}$ inch round, ¼ inch square and $\frac{1}{16}$ x ½ inch flat, all 5 inches long.

ROUND WIRE

IN STOCK

Bright and black annealed, coppered, galvanized and tinned, in coils.

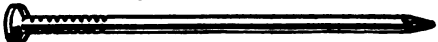


EXTRAS FOR SIZE

Washburn & Moen Gauge	Advances are per 100 Pounds			
	Annealed	Galvanized (Add to Price of Annealed)	Coppered (Add to Price of Annealed)	Tinned (Add to Price of Annealed)
No. 9 and coarser	Base	$0.40	$0.40	$1.00
No. 10	$0.05	.40	.40	1.00
No. 11	.10	.40	.40	1.00
Nos. 12 and 12½	.15	.40	.40	1.00
No. 13	.25	.40	.40	1.00
No. 14	.35	.40	.40	1.00
No. 15	.45	.70	.40	1.00
No. 16	.55	.70	.40	1.00
No. 17	.70	1.10	.40	1.00
No. 18	.85	1.10	.40	1.00

Straightened and cut lengths can be furnished from mill.
Coppered bessemer rods in 4 and 12 foot lengths.

COMMON NAILS



Size	Length, Inches	Gauge Number	Approximate Number to Pound	Advance Over Base Price, per 100 Pounds
2d	1	15	876	$0.70
3d	1¼	14	568	.45
4d	1½	12½	316	.30
5d	1¾	12½	271	.30
6d	2	11½	181	.20
7d	2¼	11½	161	.20
8d	2½	10¼	106	.10
9d	2¾	10¼	96	.10
10d	3	9	69	.05
12d	3¼	9	63	.05
16d	3½	8	49	.05
20d	4	6	31	Base
30d	4½	5	24	Base
40d	5	4	18	Base
50d	5½	3	14	Base
60d	6	2	11	Base

Galvanized Roofing Nails, see Roofing Sheets, page 313.

WIRE CLOTH

We carry in stock a complete assortment of the standard grades of wire cloth. We can furnish promptly any mesh made from any kind or size of wire.

When ordering state whether black or galvanized, size of wire mesh, length and width desired and whether mesh is center to center or clear space.

The mesh of wire cloth is the distance from center to center of adjacent wires. No length less than 100 feet will be considered a full roll.

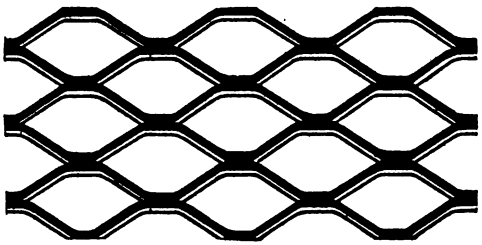
SIZES AND LIST PRICE PER SQUARE FOOT

Wire Number	Number of Mesh														
	1	¾	⅝	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
3	88	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
4	73	88	....	....	....	....	....	....	....	....	....	....	....	....	....	....
5	60	73	88	....	....	....	....	....	....	....	....	....	....	....	....	....
6	48	60	73	....	....	....	....	....	....	....	....	....	....	....	....	....
7	38	48	60	....	....	....	....	....	....	....	....	....	....	....	....	....
8	32	38	48	60	....	....	....	....	....	....	....	....	....	....	....	....
9	27	32	38	48	60	....	....	....	....	....	....	....	....	....	....	....
10	22	27	32	38	48	60	....	....	....	....	....	....	....	....	....	....
11	17	22	27	32	38	48	60	....	....	....	....	....	....	....	....	....
12	14	17	22	27	32	38	48	60	....	....	....	....	....	....	....	....
13	12	14	17	22	27	32	38	48	57	60	....	....	....	....	....	....
14	10	12	14	17	22	27	32	38	45	48	60	....	....	....	....	....
15	8	10	12	14	17	22	27	32	35	38	48	60	....	....	....	....
16	....	8	10	12	14	17	22	27	29	32	38	48	60	....	....	....
17	....	....	8	10	12	14	17	22	24	27	32	38	48	60	....	....
18	....	....	....	8	10	12	14	17	19	22	27	32	38	48	60	....
19	....	....	....	....	8	10	12	14	15	17	22	27	32	38	48	60
20	....	....	....	....	....	8	10	12	13	14	17	22	27	32	38	48
21	....	....	....	....	....	....	8	10	11	12	14	17	22	27	32	38
22	....	....	....	....	....	....	....	8	9	10	12	14	17	22	27	32
23	....	....	....	....	....	....	....	....	7	8	10	12	14	17	22	27
24	....	....	....	....	....	....	....	....	....	7	8	10	12	14	17	22
25	....	....	....	....	....	....	....	....	....	....	7	8	10	12	14	17
26	....	....	....	....	....	....	....	....	....	....	....	7	8	10	12	14
27	....	....	....	....	....	....	....	....	....	....	....	....	7	8	10	12
28	....	....	....	....	....	....	....	....	....	....	....	....	....	7	8	10
29	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7	8
30	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7

Wire Number	Number of Mesh														
	14	16	18	20	22	24	30	40	50	60	64	70	74	80	
20	60	....	....	....	....	....	....	....	....	....	....	....	....	....	
21	48	....	....	....	....	....	....	....	....	....	....	....	....	....	
22	38	60	....	....	....	....	....	....	....	....	....	....	....	....	
23	32	48	60	....	....	....	....	....	....	....	....	....	....	....	
24	27	38	48	62	....	....	....	....	....	....	....	....	....	....	
25	22	32	38	52	65	....	....	....	....	....	....	....	....	....	
26	17	27	32	43	55	65	....	....	....	....	....	....	....	....	
27	15	22	27	35	46	55	....	....	....	....	....	....	....	....	
28	13	17	22	27	38	46	66	....	....	....	....	....	....	....	
29	12	15	17	24	30	38	56	....	....	....	....	....	....	....	
30	11	13	15	20	26	30	47	....	....	....	....	....	....	....	
31	10	12	13	17	22	26	37	68	....	....	....	....	....	....	
32	9	11	12	15	19	22	31	57	....	....	....	....	....	....	
33	8	10	11	13	17	19	27	48	....	....	....	....	....	....	
34	7	9	10	12	15	17	23	44	80	....	....	....	....	....	
35	....	8	9	10	13	15	20	40	65	100	....	....	....	....	
36	....	....	8	9	12	13	19	36	60	85	....	....	....	....	
37	....	....	....	....	....	....	....	32	56	70	85	105	....	....	
38	....	....	....	....	....	....	....	....	....	65	70	90	....	....	
39	....	....	....	....	....	....	....	....	....	58	65	80	100	....	
40	....	....	....	....	....	....	....	....	....	....	....	....	90	120	
41	....	....	....	....	....	....	....	....	....	....	....	....	....	110	

EXPANDED METAL AND LATH

STOCK SIZES



ACTUAL SIZE OF MESH

EXPANDED METAL PLASTERING LATH

The "Perfect Key" Lath requires a minimum of plaster.

Size of Sheet 18×96 Inches, Gauge	Weight per Bundle, Pounds	Yards per Bundle	Sheets per Bundle	Weight per Yard, Pounds
No. 27	27½	12	9	2⅓
No. 26	30	12	9	2½
No. 25	36	12	9	3.0
No. 24	40½	12	9	3.4

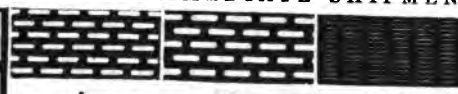
Add ¾ to one pound per square yard when galvanized. Furnished plain, painted or galvanized after expansion.

3 IN. x 8 IN. MESH FOR REINFORCING CONCRETE

Number	Gauge of Steel	Weight, Lbs. per Sq. Ft.	Width, Feet	Length, Feet
06–3	3″-16 ga.	.2	2,3,4,5, 6, 7, 8	8 and 12
10–3	3″-12 ga.	.34	2, 4, 8	8 and 12
16–3	3″-10 ga. Single Strand	.55	2, 3, 4, 6, 8	8 and 12
20–3		.68	3′ 3″ or 6′ 6″	8 and 12
25–3	3″- 10 ga.+50%	.85	2, 3, 4, 6, 8	8 and 12
30–3		1.02	4′, 8′	8 and 12
32–3	3″-10 ga. Double Strand	1.07	2, 3, 4, 6, 8	8 and 12
35–3		1.185	2′, 4′, 7′ 6″, 8′	8 and 12
40–3	3″-7 ga.	1.36	3′ 6″, 7′ 0″	8 and 12

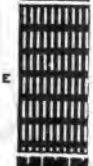
SMALL MESHES FOR SCREENS, ETC.

Number	Gauge of Steel	Weight Lbs. per Sq. Ft.	Width, Feet	Length, Feet
20– ½	½″-18 ga.	.68	3′ 6″, 7	8 only
10– ¾	¾″-16 ga.	.34	3′ 6″, 7	8 only
25– ¾	¾″-12 ga.	.86	3′ 6″, 7	8 only
10–1½	1½″-16 ga.	.34	2, 3, 4, 5, 6	8 and 12
20–1½	1½″-12 ga.	.68	2, 3, 4, 6	8 and 12



PERFORATED STEEL SHEETS AND PLATES

We furnish perforated steel sheets and plates of thicknesses and sizes as required for general and special purposes. The marginal illustrations represent a few of the many varieties of perforated plates we are in position to furnish.



Because of the difference in requirements, it is impracticable to carry perforated material in stock, but having the largest stock of flat unpunched sheets and plates in the greatest variety of sizes and facilities for having them made up on order, enables us to offer unequalled service in this line.

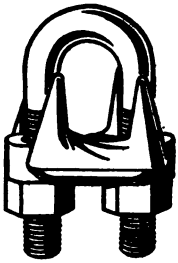
When desired, plates and sheets can be perforated leaving margins and other portions blank, or they can be rolled to make revolving screens.

To avoid misunderstandings, we suggest that a sketch of what is required accompany inquiries or orders. Reference can be made to marginal illustrations as a guide to the style of perforating desired, but the sketch or specifications should show:

1. Size, thickness and shape of sheet or plate.
2. Size and shape of perforations.
3. Location of perforations with reference to each other and to long way of sheet or plate.
4. Distance between perforations.
5. Location and size of any blank spaces.

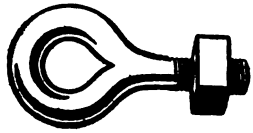
WIRE ROPE FITTINGS AND FASTENINGS

Standard Hoisting Rope, Extra Flexible Hoisting Rope and Galvanized Iron Ship Rigging or Guy Rope is carried in stock at all times ready for immediate shipment.

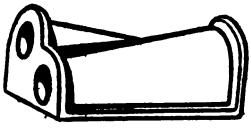


MALLEABLE CLIP

OVAL THIMBLE



EYE BOLT



BAND LUG

3-BOLT CLAMP

The above, or any type of fitting desired, can be shipped promptly—in most cases immediately from stock. Prices quoted on request.

TURNBUCKLES

WITH HOOK AND EYE, TWO EYES OR TWO HOOKS

Outside Diameter of Screw, Inches	Length in the Clear Between Heads, Inches	Price, Each		Outside Diameter of Screw, Inches	Length in the Clear Between Heads, Inches	Price, Each	
		Galvanized	Plain			Galvanized	Plain
3/16	3½	$0.80	$0.70	7/8	10	$4.25	$3.60
¼	4	.85	.75	1	11	5.50	4.75
5/16	4¼	.90	.80	1⅛	12	6.75	5.50
⅜	4½	1.10	.95	1¼	13	8.25	6.75
7/16	5	1.25	1.05	1⅜	14	9.75	7.75
½	6	1.50	1.30	1½	15	12.00	9.50
9/16	7¼	1.85	1.65	1⅝	16	15.00	13.00
⅝	8½	2.20	1.75	1¾	18	20.00	17.00
¾	9¼	3.25	2.60	2	24	28.00	25.00

GASKETS

We can furnish promptly, Lead and Copper Gaskets either plain or corrugated. Special sizes to order.

7—SMALL TOOLS

IN addition to a complete line of the heavier machinery entering into the manufacture of iron and steel products, we manufacture a complete assortment of small tools and equipment embracing small hand and power punches, shears, rolls, riveters, saws, brakes, hoists, trolleys, forges, blowers, jacks, expanders, tube cutters, etc.

Through our interest in the Lennox Machine Company and other manufacturers, we are placed in excellent position to offer special machines for unusual requirements and as a result of the establishment of a Mechanical Engineering Department, we can offer personal service in the study of your shop arrangements and methods of manufacture and offer you the benefit of an experience in the design and equipment of many of the largest and most efficient shops in this country.

We will be pleased to furnish catalogs and complete information covering any of our machinery or small tool lines on request. We endeavor to carry a complete assortment of standard tools in stock for immediate shipment on hurried requirements.

7—SMALL TOOLS

	Page		Page
Ryerson Drills	701	Punches, Dies and Couplings.	712
Ryerson Reamers	707	Hoists	714
Sockets	708	Trolleys	715
Track Bits	710	Tube Expanders	716
Ryerson Rivet Sets	711	Forges	718

ASSOCIATED SUBJECTS

Complete Alphabetical Index will be found on last four pages of the book.

RYERSON FORGED HIGH SPEED TWIST DRILLS

TAPER SHANK

STRAIGHT SHANK. LONG SERIES

LIST No. 20 A

Diameter, Inches	Decimal Equivalent	Price, Each	Length Over All, Inches	Length Twist, Inches	Standard Taper Shank
1/16	.0625	$0.90	3 7/8	1 1/16	No. 1
3/32	.0937	.90	4 1/2	1 5/8	
1/8	.1250	.90	5 1/8	2 1/8	
5/32	.1562	.90	5 3/8	2 3/8	
3/16	.1875	.90	5 3/4	2 5/8	
7/32	.2187	1.00	6	2 7/8	
1/4	.2500	1.10	6 1/8	3	
9/32	.2812	1.20	6 1/4	3 1/8	
5/16	.3125	1.30	6 3/8	3 1/4	
11/32	.3437	1.40	6 1/2	3 3/8	
3/8	.3750	1.50	6 3/4	3 1/2	
13/32	.4062	1.65	7	3 3/4	
7/16	.4375	1.75	7 1/4	4	
15/32	.4687	1.90	7 1/2	4 5/16	
1/2	.5000	2.00	7 3/4	4 1/2	
17/32	.5312	2.15	8	4 3/4	
9/16	.5625	2.25	8 1/4	5	
19/32	.5937	2.40	8 1/2	5	No. 2
5/8	.6250	2.50	8 3/4	5 1/8	
21/32	.6562	2.75	9	5 1/4	
11/16	.6875	3.00	9 1/4	5 1/2	
23/32	.7187	3.25	9 1/2	5 7/8	
3/4	.7500	3.50	9 3/4	6 1/8	
25/32	.7812	3.75	9 7/8	6 1/4	
13/16	.8125	4.00	10	6 3/8	
27/32	.8437	4.40	10 1/4	6 1/2	
7/8	.8750	4.75	10 1/2	6 7/8	
29/32	.9062	5.15	10 5/8	7	

64th inch sizes take price of next larger size.

RYERSON FORGED HIGH SPEED TWIST DRILLS

LIST No. 20 A — **CONTINUED**

Diameter, Inches	Decimal Equivalent	Price, Each	Length Over All, Inches	Length Twist, Inches	Standard Taper Shank
15/16	.9375	$ 5.50	10 3/4	6 5/8	
31/32	.9687	5.90	10 7/8	6 3/4	
1	1.0000	6.25	11	6 7/8	
1 1/32	1.0311	6.75	11 1/8	7	
1 1/16	1.0625	7.25	11 1/4	7 1/8	
1 3/32	1.0937	7.75	11 1/2	7 3/8	
1 1/8	1.1250	8.25	11 3/4	7 5/8	No. 3
1 3/32	1.1562	8.90	11 7/8	7 3/4	
1 3/16	1.1875	9.50	12	7 7/8	
1 7/32	1.2187	10.15	12 1/8	8	
1 1/4	1.2500	10.75	12 1/2	8 1/4	
1 9/32	1.2812	11.50	14 1/8	8 5/8	
1 5/16	1.3125	12.25	14 1/4	8 3/4	
1 11/32	1.3437	13.00	14 3/8	8 7/8	
1 3/8	1.3750	13.75	14 1/2	9	
1 13/32	1.4062	14.65	14 5/8	9 1/8	
1 7/16	1.4375	15.50	14 3/4	9 1/4	
1 15/32	1.4687	16.40	14 7/8	9 3/8	
1 1/2	1.5000	17.25	15	9 1/2	
1 17/32	1.5312	18.15	15 1/8	9 5/8	
1 9/16	1.5625	19.00	15 1/4	9 3/4	
1 19/32	1.5937	20.00	15 3/8	9 7/8	
1 5/8	1.6250	21.00	15 1/2	10	
1 21/32	1.6562	22.00	15 5/8	10 1/8	No. 4
1 11/16	1.6875	23.00	15 3/4	10 1/4	
1 23/32	1.7187	24.00	15 7/8	10 3/8	
1 3/4	1.7500	25.00	16	10 1/2	
1 25/32	1.7812	26.25	16 1/8	10 1/2	
1 13/16	1.8125	27.50	16 1/4	10 1/2	
1 27/32	1.8437	28.75	16 3/8	10 1/2	
1 7/8	1.8750	30.00	16 1/2	10 5/8	
1 29/32	1.9062	31.25	16 1/2	10 5/8	
1 15/16	1.9375	32.50	16 1/2	10 5/8	
1 31/32	1.9687	33.75	16 1/2	10 5/8	
2	2.0000	35.00	16 1/2	10 5/8	
2 1/32	2.0312	36.25	16 1/2	9 3/4	No. 5
2 1/16	2.0625	37.50	17	10	

64th inch sizes take price of next larger size.

RYERSON FORGED HIGH SPEED TWIST DRILLS

LIST No. 20 A — **CONTINUED**

Diameter, Inches	Decimal Equivalent	Price, Each	Length Over All, Inches	Length Twist, Inches	Standard Taper Shank
2 3/32	2.0937	$38.75	17	10	No. 5
2 1/16	2.1250	40.00	17	10	
2 5/32	2.1562	41.25	17	10	
2 3/16	2.1875	42.50	17	10	
2 7/32	2.2187	43.75	17 1/2	10 1/2	
2 1/4	2.2500	45.00	17 1/2	10 1/2	
2 9/32	2.2812	47.50	17 1/2	10 1/2	
2 5/16	2.3125	50.00	17 1/2	10 1/2	
2 11/32	2.3437	52.50	18	10 3/4	
2 3/8	2.3750	55.00	18	10 3/4	
2 13/32	2.4062	57.50	18 1/2	11 1/4	
2 7/16	2.4375	60.00	18 1/2	11 1/4	
2 15/32	2.4687	62.50	19	11 3/4	
2 1/2	2.5000	65.00	19	11 3/4	
2 17/32	2.5312	67.50	19 1/4	12	
2 9/16	2.5625	70.00	19 1/4	12	
2 19/32	2.5937	72.50	19 1/2	12 1/8	
2 5/8	2.6250	75.00	19 1/2	12 1/8	
2 21/32	2.6562	77.50	20	12 5/8	
2 11/16	2.6875	80.00	20	12 5/8	
2 23/32	2.7187	82.50	20 1/2	13	
2 3/4	2.7500	85.00	20 1/2	13	
2 25/32	2.7812	87.50	20 1/2	13	
2 13/16	2.8125	90.00	20 1/2	13	
2 27/32	2.8437	92.50	21	13 1/2	
2 7/8	2.8750	95.00	21	13 1/2	
2 29/32	2.9062	97.50	21	13 1/2	
2 15/16	2.9375	100.00	21	13 1/2	
2 31/32	2.9687	102.50	22	14 3/4	
3	3.0000	105.00	22	14 3/4	
3 1/16	3.0625	112.50	22	12 1/4	No. 6
3 1/8	3.1250	120.00	22	12 1/4	
3 3/16	3.1875	127.50	22	12 1/4	
3 1/4	3.2500	135.00	23	13 1/4	
3 5/16	3.3125	142.50	23	13 1/4	
3 3/8	3.3750	150.00	23	13 1/4	

64th inch sizes take price of next larger size.

RYERSON FORGED HIGH SPEED TWIST DRILLS

LIST No. 20 A — CONTINUED

Diameter, Inches	Decimal Equivalent	Price, Each	Length Over All, Inches	Length Twist, Inches	Standard Taper Shank
3 7/16	3.4375	$157.50	23	13 1/4	No. 6
3 1/2	3.5000	165.00	24	14 1/4	
3 9/16	3.5625	172.50	24	14 1/4	
3 5/8	3.6250	180.00	24	14 1/4	
3 11/16	3.6875	187.50	24	14 1/4	
3 3/4	3.7500	195.00	24	14 1/4	
3 13/16	3.8125	202.50	24	14 1/4	
3 7/8	3.8750	210.00	24	14 1/4	
3 15/16	3.9375	217.50	24	14 1/4	
4	4.0000	225.00	25	15	

64th inch sizes take price of next larger size.

RYERSON TAPER SHANK TWIST DRILLS

WITH ENLARGED TAPER SHANK

LIST NO. 22 B — HIGH SPEED STEEL

Diameter, Inches	Decimal Equivalent	Price, Each	Whole Length, Inches	Flute Length, Inches	Taper Shank
1/2	.5	$1.30	9 5/16	4 11/16	No. 2
17/32	.5312	1.40	9 9/16	4 11/16	
9/16	.5625	1.50	9 13/16	5 1/16	
19/32	.5937	1.60	10 1/8	4 11/16	No. 3
5/8	.625	1.75	10 3/8	5 1/16	
21/32	.6562	1.90	10 5/8	5 1/16	
11/16	.6875	2.05	10 7/8	5 5/16	
23/32	.7187	2.25	11 1/4	5 11/16	
3/4	.75	2.40	11 1/2	6 1/16	
25/32	.7812	2.60	11 5/8	6 5/16	
13/16	.8125	2.80	11 3/4	6 1/16	
27/32	.8437	3.00	12 1/4	6 1/16	
7/8	.875	3.20	12 1/2	6 11/16	
29/32	.9062	3.45	12 5/8	6 11/16	

Special lengths and diameters made to order.
64th inch sizes take price of next larger size.

RYERSON TAPER SHANK TWIST DRILLS

LIST NO. 22 B — CONTINUED

Diameter, Inches	Decimal Equivalent	Price, Each	Whole Length, Inches	Flute Length, Inches	Taper Shank
15/16	.9375	$ 3.75	18 1/16	6 1/4	No. 4
31/32	.9687	4.05	13 1/16	6 3/8	
1	1.	4.35	13 1/16	6 1/2	
1 1/32	1.0312	4.75	13 1/16	6 5/8	
1 1/16	1.0625	5.10	13 1/16	6 3/4	
1 1/32	1.0937	5.45	13 1/16	7	
1 1/8	1.125	5.80	14 1/16	7 1/4	
1 5/32	1.5162	6.20	14 1/16	7 3/8	
1 3/16	1.1875	6.55	14 1/16	7 1/2	
1 7/32	1.2187	6.90	14 1/16	7 5/8	
1 1/4	1.25	7.20	14 1/16	8	
1 9/32	1.2812	7.60	16 3/4	8 5/8	No. 5
1 5/16	1.3125	8.00	16 7/8	8 3/4	
1 11/32	1.3437	8.40	17	8 7/8	
1 3/8	1.375	8.80	17 1/8	9	
1 13/32	1.4062	9.20	17 1/4	9 1/8	
1 7/16	1.4375	9.60	17 3/8	9 1/4	
1 15/32	1.4687	10.00	17 1/2	9 3/8	
1 1/2	1.5	10.40	17 5/8	9 1/2	
1 17/32	1.5312	10.80	18 1/16	9 5/8	
1 9/16	1.5625	11.20	18 1/16	9 3/4	
1 19/32	1.5937	11.65	18 1/16	9 7/8	
1 5/8	1.625	12.10	18 1/16	10	
1 21/32	1.6562	12.60	18 1/16	10 1/8	
1 11/16	1.6875	13.05	18 1/16	10 1/4	
1 23/32	1.7187	13.60	18 1/16	10 3/8	
1 3/4	1.75	14.10	19 1/16	10 1/2	
1 25/32	1.7812	14.55	19 1/16	10 5/8	
1 13/16	1.8125	15.00	19 1/16	10 3/4	
1 27/32	1.8437	15.50	19 1/16	10 7/8	
1 7/8	1.875	16.00	19 1/16	11	
1 29/32	1.9062	16.55	19 1/16	11	
1 15/16	1.9275	17.10	19 1/16	11	
1 31/32	1.9687	17.65	19 1/16	11	
2	2.	18.20	19 1/16	11	

Special lengths and diameters made to order.
64th inch sizes take price of next larger size.

RYERSON FORGED HIGH SPEED STRAIGHT SHANK TWIST DRILLS

JOBBERS' OR SHORT LENGTHS

LIST NO. 23

Diameter, Inches	Decimal Equivalent	Price, Per Dozen	Length Over All, Inches	Length Twist, Inches
1/16	.0625	$12.00	2 1/2	1 1/4
5/64	.0781	10.00	2 5/8	1 3/8
3/32	.0937	9.00	2 3/4	1 1/2
7/64	.1094	9.00	2 7/8	1 5/8
1/8	.1250	8.50	3	1 3/4
9/64	.1406	8.50	3 1/8	1 7/8
5/32	.1562	7.50	3 1/4	2
11/64	.1719	7.50	3 3/8	2 1/8
3/16	.1875	6.50	3 1/2	2 1/4
13/64	.2031	7.35	3 5/8	2 3/8
7/32	.2187	7.35	3 3/4	2 1/2
15/64	.2344	7.35	3 7/8	2 5/8
1/4	.2500	7.35	4	2 3/4
17/64	.2656	9.10	4 1/8	2 7/8
9/32	.2812	9.10	4 1/4	2 31/32
19/64	.2969	10.50	4 3/8	3 3/32
5/16	.3125	10.50	4 1/2	3 3/16
21/64	.3281	12.00	4 5/8	3 5/16
11/32	.3437	12.00	4 3/4	3 13/32
23/64	.3594	13.50	4 7/8	3 17/32
3/8	.3750	13.50	5	3 5/8
25/64	.3906	15.00	5 1/8	3 3/4
13/32	.4062	15.00	5 1/4	3 27/32
27/64	.4219	17.00	5 3/8	3 31/32
7/16	.4375	17.00	5 1/2	4 1/16
29/64	.4531	18.75	5 5/8	4 3/16
15/32	.4687	18.75	5 3/4	4 5/16
31/64	.4844	20.00	5 7/8	4 11/32
1/2	.5000	20.00	6	4 1/2

TAPER SHANK BRIDGE REAMERS

FOR BOILERMAKERS, BRIDGE, SHIP AND CAR BUILDERS

TAPER SHANK BRIDGE REAMERS

WITH CARBON TAPER SHANK—ADJUSTABLE

LIST NO. 60 **HIGH SPEED STEEL**

Diameter Inches, A and B	Diameter Inches, C	Decimal Equivalent	Price, Each	Whole Length, Inches	Flute Length, Inches	Length B to C, Inches	Taper Shank
1/4	5/32	.25	$ 3.00	5 9/16	2 3/4	1	No. 1
5/16	2/16	.3125	3.25	6 1/16	3 1/4	1 1/4	
3/8	7/32	.375	3.50	6 9/16	3 3/4	1 5/8	
7/16	1/4	.4375	3.75	8 1/4	4 7/8	2 1/8	No. 2
1/2	5/16	.5	4.00	9	5 5/8	2 1/8	
9/16	3/8	.5625	4.25	9	5 5/8	2 1/8	
5/8	3/8	.625	4.50	10	6 5/8	2 1/4	
11/16	3/8	.6875	4.75	11 3/4	7 11/16	2 1/4	No. 3
3/4	7/16	.75	5.00	12	7 15/16	2 1/4	
13/16	1/2	.8125	5.30	12	7 15/16	2 1/2	
7/8	9/16	.875	5.70	12	7 15/16	2 1/2	
15/16	5/8	.9375	6.00	12	7 15/16	2 5/8	
1	11/16	1.	6.50	12	7 15/16	2 5/8	
1 1/16	3/4	1.0625	7.00	12	7 15/16	2 5/8	
1 1/8	13/16	1.125	7.50	12	7 15/16	2 5/8	
1 3/16	7/8	1.1875	8.00	12	7 15/16	2 5/8	
1 1/4	7/8	1.25	8.75	12	7 15/16	2 5/8	
1 5/16	1	1.3125	9.50	13	7 7/8	2 5/8	No. 4
1 3/8	1 1/16	1.375	10.50	13	7 7/8	2 5/8	
1 7/16	1 1/8	1.4375	12.00	13	7 7/8	2 5/8	
1 1/2	1 13/16	1.5	14.00	13	7 5/8	2 5/8	

32nd sizes take price of next larger size.

CARBON STEEL TAPER SHANK BRIDGE REAMERS

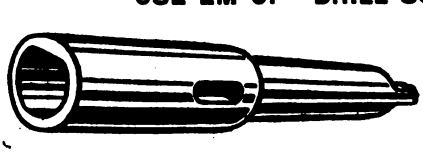
FOR BOILERMAKERS, BRIDGE, SHIP AND CAR BUILDERS

LIST NO. 160 A — **CARBON STEEL**

Diameter Inches, A and B	Diameter Inches, C	Decimal Equivalent	Price, Each	Whole Length, Inches	Flute Length, Inches	Length B to C, Inches	Taper Shank
7/16	1/4	.4375	$2.75	8 1/4	4 3/8	2 1/8	No. 2
1/2	5/16	.5	2.75	9	5 1/16	2 1/8	
9/16	3/8	.5625	2.80	9	5 1/16	2 1/4	
5/8	3/8	.625	2.90	10	6	2 1/4	
11/16	3/8	.6875	3.00	11 3/4	6 1/16	2 1/4	No. 3
3/4	7/16	.75	3.10	12	7 3/8	2 1/4	
13/16	1/2	.8125	3.30	12	7 1/16	2 1/2	
7/8	9/16	.875	3.50	12	7 1/16	2 1/2	
15/16	5/8	.9375	3.70	12	7 1/16	2 5/8	
1	11/16	1.	3.90	12	7 1/16	2 5/8	
1 1/16	11/16	1.0625	4.00	12	7 1/16	2 5/8	
1 1/8	11/16	1.125	4.30	12	7 1/16	2 5/8	
1 3/16	11/16	1.1875	4.60	12	7 1/16	2 5/8	
1 1/4	7/8	1.25	4.90	13	7 1/16	2 5/8	
1 5/16	1	1.3125	5.20	13	7 1/16	2 5/8	No. 4
1 3/8	1 1/16	1.375	5.60	13	7 1/16	2 5/8	
1 7/16	1 1/8	1.4375	6.00	13	7 1/16	2 5/8	

32nd sizes take price of next larger size.

"USE EM UP" DRILL SOCKETS



SOCKET TYPE

Take List No. 3 on page 709. Also furnished in sleeve type taking List No. 4 on page 709.

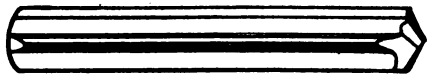
STEEL SOCKETS

CARBON STEEL		LIST No. 4
No. 1.	With Shank fitted to No. 2 Socket	$ 2.00
No. 1.	With Shank fitted to No. 3 Socket	2.50
No. 1.	With Shank fitted to No. 4 Socket	3.20
No. 1.	With Shank fitted to No. 5 Socket	4.80
No. 2.	With Shank fitted to No. 3 Socket	2.50
No. 2.	With Shank fitted to No. 4 Socket	3.20
No. 2.	With Shank fitted to No. 5 Socket	4.80
No. 3.	With Shank fitted to No. 2 Socket	3.20
No. 3.	With Shank fitted to No. 3 Socket	3.20
No. 3.	With Shank fitted to No. 4 Socket	3.20
No. 3.	With Shank fitted to No. 5 Socket	4.80
No. 4.	With Shank fitted to No. 3 Socket	4.80
No. 4.	With Shank fitted to No. 4 Socket	4.80
No. 4.	With Shank fitted to No. 5 Socket	4.80
No. 4.	With Shank fitted to No. 6 Socket	12.00
No. 5.	With Shank fitted to No. 4 Socket	12.00
No. 5.	With Shank fitted to No. 5 Socket	12.00
No. 5.	With Shank fitted to No. 6 Socket	12.00

STEEL SLEEVES

CARBON STEEL		LIST No. 3
No. 1.	Fitted to No. 2 Socket	$ 1.80
No. 1.	Fitted to No. 3 Socket	2.40
No. 1.	Fitted to No. 4 Socket	3.00
No. 1.	Fitted to No. 5 Socket	4.40
No. 2.	Fitted to No. 3 Socket	2.40
No. 2.	Fitted to No. 4 Socket	3.00
No. 2.	Fitted to No. 5 Socket	4.40
No. 3.	Fitted to No. 4 Socket	3.00
No. 3.	Fitted to No. 5 Socket	4.40
No. 4.	Fitted to No. 5 Socket	4.40
No. 4.	Fitted to No. 6 Socket	10.00
No. 5.	Fitted to No. 6 Socket	10.00

HIGH SPEED FLAT BEADED TRACK BITS



LIST No. 32

Size, Inches	Length, Inches	Price, Each	Size, Inches	Length, Inches	Price, Each
1/2	6	$0.95	15/16	6	$1.50
9/16	6	1.00	1	6	1.55
5/8	6	1.05	1 1/16	6	1.65
11/16	6	1.10	1 1/8	6	1.75
3/4	6	1.20	1 3/16	6	1.85
13/16	6	1.30	1 1/4	6	1.95
7/8	6	1.40	1 5/16	6	2.10

HIGH SPEED FLAT TRACK BITS

FLATTED ROUND SHANKS, 2½ INCHES LONG, ⅝ INCHES DIAMETER

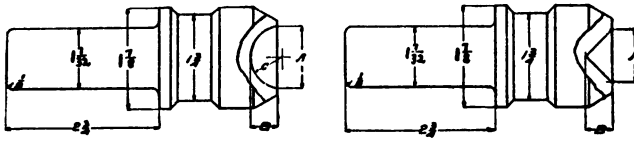
LIST No. 30

Size, Inches	Length, Inches	Price, Each	Size, Inches	Length, Inches	Price, Each
1/2	6	$0.95	15/16	6	$1.50
9/16	6	1.00	1	6	1.55
5/8	6	1.05	1 1/16	6	1.65
11/16	6	1.10	1 1/8	6	1.75
3/4	6	1.20	1 3/16	6	1.85
13/16	6	1.30	1 1/4	6	1.95
7/8	6	1.40	1 5/16	6	2.10

RYERSON RIVET SETS

The Ryerson Rivet Sets are hammered from solid round-bar stock. This refines the steel to such an extent that the crystallisation which usually takes place in the neck or fillet of the set, causing undue breakage, is largely eliminated. Another important advantage of these sets over the turned sets is that the hammering process produces a denser grain in the metal and as a result a full blow of the hammer is transmitted to the rivet. This means that the rivets can be driven more rapidly, an advantage which is readily verified by the operator testing the turned set and then our hammered set. These sets are furnished with standard button and cone cupping, as per dimensions shown in the diagrams. Special cupping can be furnished when desired, in which case the exact dimensions of template must be furnished.

DIMENSIONS OF STANDARD CUPS



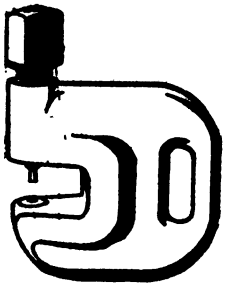
CONE HEAD SETS

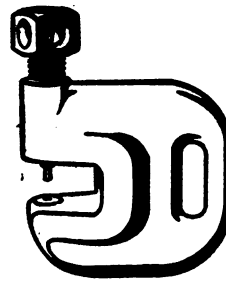
Diameter of Rivets, Inches	3/8	7/16	1/2	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/8	1 1/4	1 1/2
A	21/32	3/4	7/8	1 3/32	1 3/16	1 5/16	1 13/32	1 17/32	1 5/8	1 23/32	1 27/32	1 15/16	2 5/32
B	9/32	21/64	23/64	15/32	33/64	9/16	5/8	21/32	45/64	47/64	51/64	53/64	59/64

BUTTON HEAD SETS

Diameter of Rivets, Inches	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/8	1 1/4	1 1/2
A	19/32	11/16	25/32	7/8	1	1 3/32	1 3/16	1 9/32	1 3/8	1 15/32	1 13/32	1 3/4	2	2 3/8
B	5/64	9/32	5/16	11/32	13/32	7/16	31/64	33/64	35/64	19/32	41/64	45/64	51/64	61/64
C	5/16	23/64	13/32	29/64	29/64	9/16	19/32	21/32	45/64	3/4	13/16	57/64	1 1/32	1 7/32

SCREW PUNCHES





Our screw punches have large screws fitted with a coupling nut at end, which can be removed, thus permitting the use of different sizes of punches. Can be furnished with either square head for ratchet or bar head. Ratchet wrench can be furnished at $10.00 net extra. One punch and die furnished with each tool; all others extra. In ordering state size of rivet hole to be punched.

FORGED STEEL SCREW PUNCHES

Size	Will Punch			Depth of Throat, Inches	Weight, Pounds	List Price
	Diameter, Inches	Thickness, Inches	Maximum Hole, Inches			
No. 1	3/8	3/8	7/16	1 1/2	22	$30.00
No. 2	5/8	5/8	11/16	2 1/2	48	40.00
No. 3	3/4	3/4	15/16	3 1/4	70	60.00
No. 4	3/4	3/4	15/16	4	100	80.00

CAST STEEL SCREW PUNCHES

Size	Will Punch			Depth of Throat, Inches	Weight, Pounds	List Price
	Diameter, Inches	Thickness, Inches	Maximum Hole, Inches			
No. 00	5/16	1/4	3/4	1 1/2	15	$20.00
No. 0	1/2	1/4	3/4	1 1/2	17	24.00
No. 1	1/2	5/16	7/8	1 1/2	27	30.00
No. 2	3/4	1/2	7/8	2 1/4	40	40.00
No. 3	3/4	3/4	1	3	60	60.00
No. 4	3/4	3/4	1	4	110	80.00

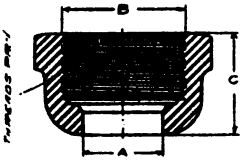
Write for discounts.

PUNCHES, DIES AND COUPLINGS

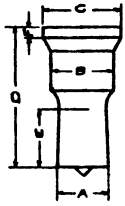
All standards and sizes of punches and dies are carried in stock for immediate shipment.

As nearly all our tools are made up on automatic machines, thus allowing us to turn out several hundred per day, we have been able to reduce our prices to such an extent that if you will carefully compare them with those of other concerns, or your cost of making punches yourself, you will find you will save considerably by buying from us.

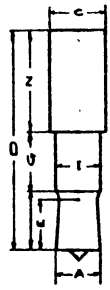
We agree to replace, free of any cost to you whatever, any punch or die which we have furnished that proves defective through poor workmanship or material.



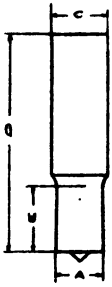
STANDARD COUPLING



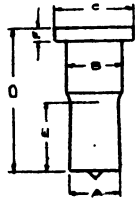
STANDARD MACHINE PUNCH



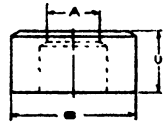
FORGED STEEL SCREW PUNCH



STRAIGHT SHANK TYPE



CAST STEEL SCREW PUNCH



STANDARD DIE

The above diagram shows the several standards now in general use. In ordering state style of punch or die desired and give dimensions to correspond to lettering.

Special punches and dies such as are used for punching hand and tube holes and square punches can be furnished promptly. In ordering special punches or dies send sketch.

RYERSON HIGH SPEED CHAIN HOIST

This hoist has greater speed than any other hoist on the market. On account of the arrangement of the parts the loss in friction is so slight that we have been able to gear it to this high speed without increasing the hand wheel pull above that of slower hoists.

An automatic brake permits the spinning of the hand wheel in either direction when the hoist is not loaded, while at the same time it locks the load with perfect safety and permits its free lowering by a slight reversed pull on the chain.

SIZES AND LIST PRICE

Capacity, Tons	Price Complete	Height of Lift, Feet	Extra Chain per Foot of Lift	Weight Complete with Chains, Pounds	Shortest Distance Between Hooks, Inches
½	$35.00	8	$0.90	62	15
1	45.00	8	.95	85	18
1½	60.00	8	1.00	107	24
2	70.00	9	1.05	133	26
3	90.00	10	1.50	195	32
4	110.00	10	1.60	250	34
5	140.00	12	2.10	386	38
6	165.00	12	2.10	402	41
8	200.00	12	2.70	464	43
10	240.00	12	3.25	610	47
12	300.00	12	3.30	647	50
16	360.00	12	3.80	872	44
20	425.00	12	6.50	1360	50
30	525.00	12	9.00	1780	63
40	650.00	12	11.50	2030	82

DIFFERENTIAL BLOCKS

This is a simple, cheap and safe chain block for use on plantations, farms and for all ordinary hoisting purposes where the higher power and durability of the duplex and triplex blocks are not required. It handles heavy loads readily and safely.

SIZES AND LIST PRICE

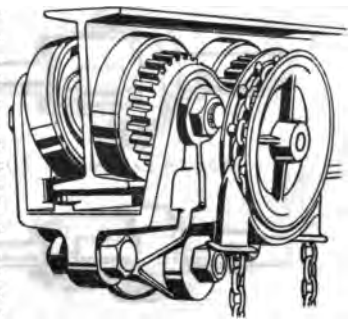
Capacity, Tons	Price Complete	Regular Hoist, Feet	Extra Hoist, Price per Foot	Minimum Distance Between Hooks, Inches	Net Weight, Pounds
⅛	$18.00	5	$2.80	16	11
¼	18.00	6	2.80	17	20
½	21.00	7	2.80	21	31
1	28.00	8	3.00	26	53
1½	36.00	8½	3.20	32	90
2	45.00	9	3.40	39	128
3	60.00	9½	4.00	44	167

DUPLEX HOIST

Where the High Speed Hoist is not required, the Duplex Block is the one we recommend. It is especially adapted for portable use, being light, powerful, durable and requiring the least head room.

Capacity, Tons	Price Complete	Regular Hoist, Feet	Extra Hoist, Price per Foot	Minimum Distance Between Hooks, Inches	Reach in Feet and Inches	Net Weight in Pounds
½	$ 25.00	8	$1.20	13	9′ 1″	43
1	30.00	8	1.50	16	9′ 4″	57
1½	40.00	8	1.75	19	9′ 7″	76
2	50.00	9	2.00	21	10′ 9″	104
3	75.00	10	2.20	25	12′ 1″	180
4	95.00	10	2.40	29	12′ 5″	215
5	140.00	12	3.00	31	14′ 7″	330
6	180.00	12	3.75	33	14′ 9″	340
8	210.00	12	4.00	36	15′ 0″	380
10	275.00	12	4.25	45	15′ 9″	560

RYERSON TROLLEYS



These Trolleys are readily adjusted to the different sizes I beams specified in the price list. They have flangeless track wheels with vertical guide rollers. The track wheels have hardened steel roller bearings (hardened steel bushings pressed into the wheels, hardened steel axles and hardened steel rollers enclosed in brass cages). On the Geared Trolley, the gears are cut. They work very freely and have a large safety factor. The Hoist is to be hung on the central bolt. The top of the hoist hook reaches to within one inch of the I beam, making a very close connection.

PRICE LIST

Capacity, Tons	Tread Diameter of Wheel, Inches	Adjustable for Sizes I Beams, Inches	Geared	Plain	Weight Geared, Pounds	Weight Plain, Pounds
½	4	5, 6, 7	.....	$16.00	.....	35
1	5	6, 7, 8	$35.00	20.00	60	47
1½	5	6, 7, 8	38.00	26.00	70	56
2	6	7, 8, 9	40.00	28.00	90	74
3	6½	8, 9, 10	47.00	33.00	118	102
4	7	9, 10, 12	52.00	37.00	177	155
5	8	10, 12, 15	65.00	43.00	218	194
6	8	10, 12, 15	80.00	55.00	265	240
8	9	12, 15, 18	95.00	70.00	421	378
10	10	15, 18, 20, 24	115.00	85.00	480	434

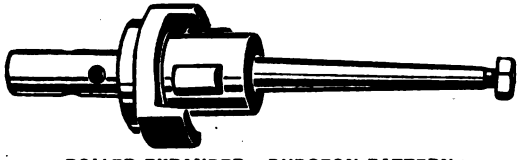
In ordering state size and weight of I beam.

Our machinery department offers you cranes of any span and capacity, arranged for hand power or motor drive and equipped with electric trolleys and hoists.

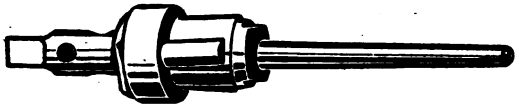
TUBE EXPANDERS

SECTIONAL EXPANDER—TYPE "A"

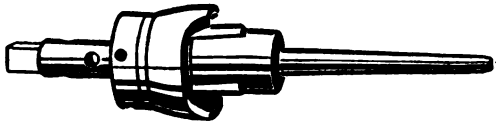
SECTIONAL EXPANDER—TYPE "B"



ROLLER EXPANDER—DUDGEON PATTERN



ALL STEEL ROLLER EXPANDER



THE FRICTIONLESS SELF-FEED ROLLER EXPANDER

LUCAS STANDARD EXPANDER

TUBE EXPANDERS

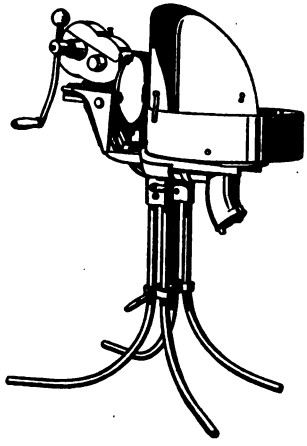
CONTINUED

We carry in stock a complete line of standard sizes of expanders illustrated on preceding page. The Ideal and Ryerson All Steel Roller Expanders can be furnished either self-feeding for power use or with rolls set straight for hand use. Sectional expanders can be made up to special contour when desired.

In ordering sectional expanders always give thickness of tube sheet.

LIST PRICES FOR COMPLETE TOOLS

Diameter, Inches	Sectional Expanders Types "A" and "B"	All Steel Roller Expander	Ideal Self-Feed Roller Expander	Roller Expander Dudgeon Pattern
1	$11.00	.....	$16.00	$10.00
1¼	11.00	.....	16.00	10.00
1½	11.00	.....	16.00	10.00
1¾	11.00	$11.00	16.00	10.00
1⅞	12.00	12.50	16.00	10.00
2	12.00	13.00	16.00	10.00
2⅛	13.00	15.00	18.00	12.00
2¼	13.00	15.50	18.00	12.00
2⅜	.....	.....	19.50	.....
2½	15.00	17.00	19.50	14.00
2⅝	.....	.....	22.00	.....
2¾	18.00	19.00	22.00	16.00
3	22.00	20.00	22.00	18.00
3¼	26.00	.....	24.50	20.00
3½	30.00	24.00	24.50	23.00
3¾	33.00	.....	27.00	25.00
4	33.00	28.00	27.00	30.00
4¼	Type "A" only 35.00	.....	37.00	35.00
4½	Type "A" only 37.00	.....	39.50	40.00
5	Type "A" only 42.00	.....	.....	50.00
5½	Type "A" only 52.00	.....	.....	55.00
6	Type "A" only 60.00	.....	.....	60.00



RYERSON PORTABLE RIVET FORGE

Our Portable Rivet Forges have Ball Bearings throughout, and produce a strong continuous blast. It will produce blasts to weld 3½ to 4 inch iron. The crank turns either way to produce the blast.

The gearing is all enclosed in an airtight casing and runs practically noiselessly. All parts can be detached in a few minutes and packed in the fire pan for transportation.

IN STOCK

Size	Diameter, Hearth	Diameter, Fan	Height	Weight, Pounds	List
401	18	9	30	115	$35.00
401½	22	9	30	120	40.00
401¾	24	10	30	135	45.00

GUNNEL PNEUMATIC FORGE

Two hundred rivets per hour can be easily heated, making it possible to keep the riveting machine at full capacity. It effects a saving of rivets, and furnishes a smooth hot rivet not burned or melted at the end. The fuel magazine is a cylindrical chamber positioned above the forge fire, which is filled with fuel and feeds down in the same manner as a self-feeding stove. The upper part of the forge is pivoted, enabling the operator to reach any rivet by simply revolving the fire bed. Weight 50 pounds.

8—PRICES AND CLASSIFICATIONS

THIS price section is the first attempt to combine for ready reference for the steel user all prices which are necessary in figuring the cost of the steel used on a particular job. We show the base price, mill and warehouse extras, standard list price and the freight rates to nearly every point within several States tributary to Chicago.

Every effort will be made to keep this section up to date if the user will cooperate by inserting changes as new pages are sent to him. In figuring a large job, it is always best to verify the total price and freight rate by wire or letter to our office. For figuring on the job or where an approximate price is necessary, this section will be found very useful.

As elsewhere in the book, the user is urged to make his own personal memoranda on these pages, which are printed on the best quality ledger paper, and insert his own additional pages under the proper sections which will be found to take standard price-book paper.

8—PRICES AND CLASSIFICATIONS

	Page
Base Price	801
Warehouse Cutting Extras	802
Freight Rates	803
Shearing, Standard Variations in	808
Shafting, Cutting Extras	808
Bars and Small Shapes, Extras	809
Steel Classification	809
Strand, Galvanized	812
Structural Shapes, Mill Extras for Size and Cutting	813
Tire Extras	813
Iron Classification	814
Saw Blades	816
Swedish or Norway Iron Classification	816
Soft Steel Hoop Extras	817
Cold Rolled Strip Steel, Extras	818
Shafting, Price List	819
Cold Rolled Steel Extras	820
Plate Extras	821
Heads, Prices for Dishing	822
Heads, Prices for Flanging	823
Flue Holes, Prices for Flanging, Drilling and Punching	824
Tubes, Price List	825
Sheets, Black Steel, Extras	826
Sheets, Galvanized, Extras	827
Rivets, Price List, Sheet, Tank and Small	828
Rivets, Tinners', Price List	829
Rivets, Miscellaneous Extras	829
Wrought Pipe, Price List	830
Tubing, Mechanical, Price List	832
Tubing, Mechanical, Cutting Charges	833
Tool Steel Classification	834
Structural Steel, Manufacturers' Standard Specifications	835
Boiler Steel, Manufacturers' Standard Specifications	839
Plates, Fire Box Steel, Specifications	842
Sheared Plates, Manufacturers' Standard Practice	843
Hot Rolled Bars, Manufacturers' Standard Specifications	844
Concrete Reinforcement Bars, Manufacturers' Standard Specifications	845

ASSOCIATED SUBJECTS

PRICES OF	Page
Differential	714
[illegible]	710
[illegible]	513
[illegible]	417
[illegible]	416
ge	510
ng	514
sion	511
ne	508, 509
[illegible]	513
Stove	912
nuts, Track	526
Cloth, Wire	605
Covers, Manhole	412
Crabs and Yokes	414
Drills	701
Expanders, Tube	617
Ferrules, Copper	418
Forges	718
Flanges	408
Handholes and Covers	414
Hangers, Boiler	406
Hangers, Loop	405
Hoists, Chain	714
Lugs, Boiler	407
Nails	604
Nozzles, Boiler	410
Nuts	518, 521
Patch Bolts	417
Plugs, Flue	415
Plugs, Fusible	415
Punches, Screw	712
Reamers	708, 709
Saddle Plates	413
Screw Punches	712
Screws, Cap	516
Screws, Coach and Lag	511
Screws, Set	517
Shields and Bolts	511
Sleeves, Drill	707
Sockets, Drill	707
Spikes, Boat	526
Strand	812
Taps	416, 417
Wire	605

Complete Alphabetical Index will be found on last four pages of the book.

CURRENT WAREHOUSE BASE PRICES

TO BE INSERTED IN RYERSON'S READY REFERENCE BOOK

PLEASE KEEP THIS PAGE UP-TO-DATE

DATE.....

Below are given our current base prices for immediate shipment from Chicago stock.

On account of changing conditions we reserve the right to change these prices without notice and invoice at prevailing warehouse market prices. Confirmation of prices, full details or net prices will be furnished on request.

Base per 100 Pounds

Structural Shapes .....

Plates .....

Soft Steel Bars .....

Blue Annealed Sheets, No. 10 Gauge .....

No. 12, 5c; No. 14, 10c; No. 16, 20c advance over No. 10.

Galvanized Steel Sheets, No. 28 Gauge .....

O. P. C. R. Soft Black Sheets, No. 28 Gauge .....

Cold Drawn Shafting .....

Round Head Steel Structural Rivets .....

Cone Head Steel Boiler Rivets .....

Machine Bolts ..... large ..... small .....

Carriage Bolts ..... large ..... small .....

.....

.....

All F. O. B. .....

PRICES ON ANY OF ABOVE—ALSO ON SPECIAL BARS, REINFORCING BARS, BOILER FITTINGS, IRON PLATES, ETC., ON REQUEST

BOILER TUBES	Lapweld Steel	Charcoal Iron	Seamless Steel
2 inches			
2½ inches			
3 inches to 3¼ inches			
3½ inches to 4½ inches			

All F. O. B. .....

WAREHOUSE CUTTING EXTRAS

For the convenience of customers we print below our card extras for cutting, which will be added to current prices on material where special cutting is required.

Cutting charging from stock: Charging Unit 100 Pounds	3 Feet and Over	2 Feet to 3 Feet	1 Foot to 2 Feet	6 Inches to 1 Foot	4 Inches to 6 Inches	2 Inches to 4 Inches
Beams and Channels, 3 inches and over	$0.00	$0.15	$0.30	$0.85	$1.40	$2.30
Zees	.00	.15	.30	.85	1.40	2.30
Tees, 3 inches and over	.00	.15	.30	.85	1.40	2.30
Angles, 2 x 2 x ¼ and over	.00	.05	.10	.20	.35	.50
Plates, rectangular: For length	.00	.05	.10	.20	.35	.50
Splitting plates, 10 cents extra. Sketch	.10	.10	.10	.10	.....	.....
Checkered	.30	.30	.30	.50	.....	.....
Sheets, No. 10 gauge	.25	.25	.25	.45	.....	.....
Sheets, No. 12 gauge	.30	.30	.30	.50	.....	.....
Sheets, No. 14 gauge	.35	.35	.35	.55	.....	.....
Sheets, No. 16 gauge	.40	.40	.40	.60	.....	.....
Sheets, No. 10 to 16, splitting in addition to length cuts, 10 cents extra.						
Sheets, No. 10 to 16, simple splitting without length cutting, No. 10, 25 cents; No. 12, 30 cents; No. 14, 35 cents; No. 16, 40 cents.						
Sheets, No. 10 to 16, wasteful splitting and sketches, price based on individual orders.						
Flats, 1 pound per foot and over to 1 inch thick, inclusive	.20	.20	.30	.50	.65	.80
Rounds, 1 pound per foot and over to 2 inches thick, inclusive	.20	.20	.30	.50	.65	.80
Squares, 1 pound per foot and over to 2 inches thick, inclusive	.20	.20	.30	.50	.65	.80
Angles, 1 pound per foot and over to 2 x 2 x ½ inches, inclusive	.20	.20	.30	.50	.65	.80
Flats, under 1 pound, per foot	.25	.25	.40	.85	1.40	2.30
Rounds, under 1 pound, per foot	.25	.25	.40	.85	1.40	2.30
Squares, under 1 pound, per foot	.25	.25	.40	.85	1.40	2.30
Angles, under 1 pound, per foot	.25	.25	.40	.85	1.40	2.30
Flats, over 1 inch in thickness	.25	.25	.40	.85	1.40	2.30
Rounds, over 2 inches diameter	.25	.25	.40	.85	1.40	2.30
Squares, over 2 inches	.25	.25	.40	.85	1.40	2.30
Tees, under 3 inches	.25	.25	.40	.85	1.40	2.30
Channels, under 3 inches	.25	.25	.40	.85	1.40	2.30
Rails	.25	.25	.40	.85	1.40	2.30
Billets	Prices on Request					
Bands						
Reinforcing Bars						

WAREHOUSE SIZE EXTRAS ON SHAPES, PLATES AND BLUE ANNEALED SHEETS

¼ inch and heavier Tank Plates, 72 inches and under	Base
Same, over 72 inches, extra	$0.10
Flange Steel	.25
Circles, 24 inches to 100 inches	.25
Same, under 24 inches to 16 inches	.50
⅛ inch, under 72 inches wide	.10
⅛ inch, 72 inches wide	.35
No. 8	.15
No. 10 Blue Annealed, 54 inches and 60 inches wide	.25
Same, 72 inches wide	.50
No. 12 Blue Annealed, 54 inches and 60 inches wide	.25
No. 14 Blue Annealed, 54 inches wide	.25
No. 16 Blue Annealed, 54 inches wide	.25

All other sizes, except galvanized sheets, take standard mill extras.

CHICAGO LESS CARLOAD FREIGHT RATES TO VARIOUS POINTS

These rates on finished steel are for convenience only and are not guaranteed, it being understood that persons using them assume all liability in the event that any railroad is unable to apply them. Carload rates and current changes will be furnished promptly on application.

ILLINOIS

	Cents		Cents		Cents		Cents
Abingdon	17	Clayton	17	Gardner	12	Lawrenceville	17½
Algonquin	12	Clinton	17	Gays	17½	Lemont	7
Alton	17½	Clyde	7	Geneva	7	LeRoy	16.8
Amboy	12	Coal City	12	Genoa	12	Lexington	15.6
Anna	23½	Cobden	23½	Gibson City	15.6	Libertyville	7
Arcola	17½	Coffeen	17½	Girard	17½	Lincoln	17
Arlington Heights	12	Colchester	17	Glenview	8	Litchfield	17½
Arthur	17	Collinsville	17½	Glenwood	8	Little York	19.4
Assumption	17½	Cordova	17	Goodfield	17	Lock Port	7
Atkinson	17	Cornell	12	Grafton	17½	Lovington	17
Auburn	17½	Creston	12	Granite City	17½	Macomb	17
Aurora	7	Crete	9.6	Granville	12	Manteno	10
Barclay	17	Cullom	14.3	Grays Lake	12	Marengo	12
Barrington	12	Dallas City	17½	Greenup	17½	Marion	23
Bartlett	10	Danville	13½	Greenview	17	Maroa	17
Batavia	7	Dawson	17	Greenville	17½	Marseilles	12
Beardstown	17	Decatur	17	Gridley	17	Marshall	17½
Belleville	19½	DeKalb	7	Gurnee	10½	Mason City	17
Belvidere	12	Delavan	17	Hamilton	17	Mattoon	17½
Bensenville	10	Des Plaines	8.3	Harrisburg	25	Mayfair	6.8
Berwyn	6.8	Dixon	12	Harvard	12	Maywood	6.8
Big Rock	12	Downers Grove	7	Harvey	8	McHenry	11.3
Bloomington	16.8	Dundee	12	Havana	17	Meadows	17
Blue Island	8	Du Quoin	22.3	Hebron	12	Melvin	15
Bradford	17	Dwight	12	Herrick	17½	Menard	23
Bradley	10	Earlville	12	Herrin	23	Mendota	12
Brainerd	7	East Alton	17½	Highland	17½	Metropolis	24.4
Bridgeport	20.8	East Lynn	15.3	Highland Park	8	Milford	14
Bristol	12	East Moline	17	Hillsboro	17½	Milledgeville	17
Browns	21.4	East Peoria	17	Hinckley	12	Millington	12
Buda	17	East St. Louis	17½	Hinsdale	7	Minier	17
Bushnell	17	Edwardsville	17½	Homer	17	Minonk	15.9
Byron	12	Effingham	17½	Homewood	10	Moline	17
Cairo	23.9	Elburn	12	Hoopeston	15	Momence	11.3
Camp Grove	17	Eldorado	23	Hubbard Woods	8	Monmouth	17
Campus	12	Elgin	7½	Indianola	17	Monroe Center	12
Canton	17	Elmhurst	7	Irving	17½	Monticello	16.8
Cantrall	17	El Paso	17	Jacksonville	17	Morris	12
Carbondale	23	Eola	7	Jerseyville	17½	Morrison	17
Carlinville	17½	Essex	12	Johnston City	23	Morrisonville	17½
Carmi	17½	Eureka	17	Joliet	7	Morton	17
Carpentersville	12	Evanston	8	Joy	17	Morton Grove	7
Cary	10½	Fairbury	12	Kankakee	10	Morton Park	7
Casey	17½	Farina	17½	Kell	17½	Mt. Carmel	17½
Centralia	17½	Farmington	17	Kempton	12	Mt. Morris	12
Champaign	16.8	Forreston	12	Kenilworth	8	Mt. Olive	17½
Charlotte	14.7	Forest Park	6.8	Kewanee	17	Mt. Pulaski	17
Chemung	12	Fox Lake	11.3	LaFayette	17	Mt. Sterling	17
Chenoa	11.7	Frankfort	7	LaGrange	7	Mt. Vernon	17½
Cherry	12	Franklin Park	7½	LaHarpe	17	Murphysboro	23
Chicago Heights	8	Freeport	12	Lake Forest	8	Naperville	7
Chrisman	17	Fulton	17	La Moille	12	New Athens	23½
Cissna Park	15	Galena	17	Lane	17	New Memphis	23
		Galesburg	17	La Salle	12	Newton	17½
		Galva	17			Niantic	17

ILLINOIS—CONTINUED

	Cents		Cents		Cents		Cents
Nokomis	17½	Plano	12	Savanna	17	Thomasboro	16.2
Norris	18.8	Plymouth	17½	Saybrook	16.8	Tinley Park	7
N. Aurora	7	Polo	12	Seneca	12	Tiskilwa	17
N. Chicago	8	Pontiac	12	Seward	12	Tremont	17
Oak Park	8	Potomac	17½	Sheffield	17	Tuscola	17
Oblong	19.9	Prairie View	10½	Shelbyville	17½	Urbana	16.8
Oglesby	17	Princeton	17	Sheridan	12	Venice	17½
Ohio	12	Prophetstown	17	Somanauk	12	Vermillion	17½
Olney	17½	Quincy	17	Sparta	23	Virden	17½
Onarga	13.9	Rankin	17	Spring Valley	12	Warsaw	21.1
Oregon	12	Ravinia	8	So. Elgin	7½	Washington	17
Orion	17	Reddick	12	So. Holland	10.9	Wataeka	13½
Ottawa	12	Richmond	12	Springfield	17	Waukegan	8
Palatine	12	Riverside	7	Staunton	17½	Waverly	17½
Pana	17½	Roanoke	17	Sterling	12	Weldon	17
Paris	17½	Robinson	19.9	St. Anne	12	W. Chicago	7
Pawnee	17½	Rochelle	12	St. Charles	7	Wheaton	7
Paw Paw	12	Rock Falls	12	St. David	17	Whitehall	17½
Paxton	15.3	Rockford	12	Steger	8	Wilmette	8
Pearl City	17	Rock Island	17	Strasburg	17½	Wilmington	12
Pekin	17	Roodhouse	17½	Streator	12	Winnetka	8
Peoria	17	Roselle	10	Sullivan	17½	Woodstock	12
Peotone	10	Rossville	17	Sycamore	7	Wyoming	17
Peru	12	Sandwich	12	Taylorville	17½	Zeigler	23
Pinckneyville	22.6						

INDIANA

	Cents		Cents		Cents		Cents
Alexandria	14	E. Chicago	08	La Fayette	13	Peru	13
Anderson	14	Elkhart	12½	La Grange	13½	Plymouth	12
Ambia	13	Elwood	14	La Porte	10	Portland	15
Attica	13	Evansville	17	Lawrenceburg	17	Princeton	17
Auburn	13½	Fairmont	14	Lebanon	14	Rensselaer	12½
Aurora	17	Ferdinand	17	Liberty	17	Richmond	16
Bedford	16	Fort Wayne	13½	Linton	16	Ridgeville	15
Berne	15	Frankfort	13½	Logansport	13	Rochester	12½
Bicknell	16	Franklin	15	Madison	17	Rushville	16
Bloomington	16	Ft. Branch	17	Marion	13½	Seymour	16½
Bluffton	14	Gary	08	Michigan City	10	Shelbyville	16
Boonville	17	Gas City	14	Middlebury	13½	South Bend	12
Bourbon	12½	Goshen	12½	Middleton	14½	Sullivan	16
Brasil	14	Grasselli	09	Nishawaka	12	Syracuse	13½
Bremen	12	Green Castle	14	Mitchell	16	Terre Haute	14
Butler	14	Greensburg	16	Monroeville	15	Tipton	14
Cambridge City	16	Hammond	08	Monticello	13	Union City	15
Cannelton	17	Hartford City	14	Montpelier	14	Urbana	13½
Clinton	14	Hobart	08	Mt. Vernon	17	Valparaiso	10
Columbia City	13	Huntington	13½	Muncie	14	Veedersburg	13½
Columbus	16	Indianapolis	14	Nappanee	12½	Vincennes	16
Connersville	16½	Indiana Harbor	8	New Albany	17	Wabash	13½
Converse	13½	Jasper	17	New Castle	15	Warsaw	12½
Crawfordsville	13½	Jeffersonville	17	Noblesville	14	Washington	16
Crown Point	08	Kendallville	13½	N. Manchester	13	Wheeler	10
Decatur	13½	Knox	10½	Oakland City	17	Winchester	15
Delphi	13	Kokomo	13	Osgood	17	Wolcott	13½
Dunkirk	14½					Wolcottville	13½

MICHIGAN

	Cents		Cents		Cents		Cents
Adrian	15	Bancroft	16	Big Rapids	18	Calumet	39
Albion	15	Battle Creek	14	Bloomingdale	14	Caro	16
Allegan	15	Bay City	16	Boyne City	26	Cass City	23
Alma	16	Belding	16	Bronson	13½	Cedar Springs	15
Almont	16	Bellevue	15	Brooklyn	15½	Charlevoix	26
Alpena	26	Benton Harbor	12	Buchanan	12	Charlotte	15
Ann Arbor	16	Bessemer	28	Cadillac	23	Cheboygan	26

MICHIGAN — CONTINUED

	Cents		Cents		Cents		Cents
Chelsea	16	Homer	15	Midland	18	Reed City	18½
Clifford	16	Houghton	32	Milan	16	Republic	28
Coldwater	13½	Howell	16	Milford	16	Rochester	16
Comstock	14	Hudson	15	Monroe	16	Royal Oak	16
Constantine	13½	Ionia	16	Montague	18	Saginaw	16
Coral	31½	Iron Mountain	28	Moore Park	13½	Saranac	16
Crystal Falls	28	Iron River	28	Morenci	16	St. Charles	16
Detroit	16	Ironwood	28	Mt. Clements	16	St. Clair	18
Dowagiac	12½	Ishpeming	28	Mt. Pleasant	18½	St. John	16
E. Jordan	26	Jackson	15	Munising	38	St. Joseph	12
Escanaba	28	Jonesville	14	Muskegon	15	St. Louis	16
Fenton	16	Kalamazoo	13½	Muskegon Heights	15	Sault Ste. Marie	28
Ferrysburg	15	Lake Mine	32	Nashville	16	Sibley	16
Flint	16	Lake Odessa	16	Negaunee	28	South Haven	7
Freeport	16	Lansing	16	Newaygo	18	Sparta	15
Galien	12	La Peer	16	Newberry	28	Stanton	16
Gladstone	28	Loretto	28	Niles	12	Sturgis	13½
Grand Haven	15	Lowell	16	Northville	16	Tecumseh	15½
Grand Ledge	16	Ludington	23	Otsego	13½	Three Rivers	13½
Grand Rapids	15	Manistee	23	Owosso	16	Traverse City	24
Greenville	16	Marcellus	13½	Petoskey	26	Union City	13½
Hale	28	Marine City	18	Pewamo	16	Vicksburg	13½
Hancock	32	Marquette	28	Pontiac	16	Vulcan	28
Harbor Beach	24	Marshall	15	Port Huron	16	Wayland	15
Harbor Springs	26	Mass City	32	Ramsay	28	Wells	26
Hastings	16	Mendon	13½	Reading	15	Woodlawn	28
Hillsdale	14	Menominee	23			Wyandotte	16
Holland	15					Ypsilanti	16

WISCONSIN

	Cents		Cents		Cents		Cents
Abbotsford	24	Edgerton	12	Marshfield	23	Reedsville	20
Albany	12	Elkhorn	12	Mauston	22	Rhinelander	25
Algoma	23	Ellsworth	25	Mayville	19	Richland Center	22½
Antigo	24	Evansville	12	Medford	25	Ripon	20
Appleton	20	Fennimore	22	Medina	20	Rothschild	23
Ashland	28	Florence	28	Menasha	20	Schlesingerville	18
Augusta	25	Fond du Lac	20	Menomonee	25	Seymour	20
Baraboo	22	Fontana	12	Merrill	23	Shawano	23
Beaver Dam	20	Footville	12	Milwaukee	10	Sheboygan	18½
Beloit	12	Ft. Atkinson	12	Mondovi	25	Sheboygan Falls	20
Berlin	20	Grafton	16	Monroe	12	S. Milwaukee	10
Black River Falls	22½	Grand Rapids	23	Montello	23	Sparta	22½
Blackwell Jct.	25	Green Bay	20	Monticello	12	Spring Green	21
Brandon	20	Greenville	20	Mosinee	23	Stetsonville	25
Brillion	20	Hackley	27	Neenah	20	Stevens Point	23
Brokaw	23	Hancock	23	New Holstein	20	Stoughton	12
Browntown	19	Hartford	19	New London	20	Stratford	23
Burlington	10	Highland	21	N. Milwaukee	10	Superior	28
Chilton	20	Horicon	19	N. Prairie	12	Theresa	20
Chippewa Falls	25	Hurley	26	Oconomowoc	12	Tomahawk	25
Clinton	12	Janesville	12	Oconto	23	Trevor	10
Clintonville	22	Juneau	19	Oshkosh	20	Two Rivers	20
Cochrane	25	Kaukauna	20	Owen	25	Walworth	12
Colfax	25	Kenosha	09	Palmyra	12	Waterloo	12
Commonwealth	28	Kewaskum	20	Phillips	26	Watertown	12
Corliss	10	Kewaunee	20	Platteville	23	Waukesha	12
Cornell	25	Kiel	20	Plymouth	20	Waupun	20
Crandon	25	Kilbourne	20	Port Washington	16	Wausau	23
Cudahy	10	La Crosse	23	Portage	20	W. Allis	10
Darlington	20	Ladysmith	28	Prairie du Chien	23	West Bend	19
Delavan	12	Lake Geneva	12	Prairi du Sac	21	Wittenberg	23
Denmark	20	Lancaster	23	Racine	10	Whitewater	12
De Pere	20	Madison	12	Reedsburg	22	Williams Bay	15
Dodgeville	21	Manitowoc	20				
Eau Claire	25	Marinette	23				

IOWA

	Cents		Cents		Cents		Cents
Adel	29	Creston	31	Lake Mills	26	Red Oak	32
Albia	29	Cumberland	32	Le Mars	32	Richland	25
Alden	28	Davenport	17	Lone Tree	24	Riverside	24
Algona	30	Decorah	25	Lorinor	29	Rockford	25
Amana	25	Des Moines	29	Low Moor	22	Rock Rapids	32
Ames	28	De Witt	22	Lyons	17	Rock Valley	32
Anamosa	23	Dubuque	17	Madrid	29	Sac City	32
Anthon	32	Dumont	26	Manchester	24	Schaller	32
Atlantic	32	Eagle Grove	30	Maquoketa	22	Seymour	30
Auburn	31	Eldora	26	Marcus	32	Sheldon	32
Audubon	32	Estherville	32	Marengo	25	Shenandoah	32
Belle Plaine	24	Fairfield	25	Marshalltown	26	Sibley	32
Bellevue	17	Farmington	25	Mason City	26	Sioux Center	32
Birmingham	25	Ft. Dodge	30	McGregor	23	Sioux City	32
Boone	29	Ft. Madison	17	Milford	32	Sioux Rapids	32
Brighton	23	Gilmore City	31	Missouri Valley	32	Spencer	32
Britt	30	Grinnell	26	Monticello	22	St. Charles	29
Bryant	22	Guttenberg	23	Montour	25	Stratford	29
Burlington	17	Hampton	26	Moulton	26	Tama	25
Calmar	25	Harlan	32	Mt. Pleasant	24	Traer	26
Carroll	31	Hedrick	26	Muscatine	17	Varina	32
Cedar Falls	25	Hudson	25	Mystic	29	Villisca	32
Cedar Rapids	24	Humboldt	30	Nashua	25	Vinton	25
Centerville	29	Independence	25	Nevada	28	Viola	23
Chariton	29	Indianola	29	Newton	28	Waukon	25
Charles City	25	Iowa City	24	Oelwein	25	Waterloo	25
Cherokee	32	Iowa Falls	28	Onawa	32	Waverly	25
Clarinda	32	Irvington	30	Osage	25	Wayland	23
Clarion	29	Janesville	25	Oskaloosa	26	Webb	32
Clayworks	30	Jefferson	29	Ottumwa	26	Webster City	29
Clinton	17	Keota	24	Pella	27	What Cheer	20
Corning	32	Keokuk	17	Perry	29	Winfield	22
Council Bluffs	32	Klemme	29	Postville	25	Winterset	31
Covington	24	Ladora	25	Prairie City	28	Woodburn	29
Cresco	25						

OHIO

	Cents		Cents		Cents		Cents
Akron	18	Chillicothe	19	Geneva	19	Marion	18
Alliance	18	Cincinnati	17	Gibsonburg	16	Martins Ferry	21
Ashland	18	Circleville	19	Girard	19	Marysville	18
Ashtabula	19	Cleveland	18	Grafton	18	Massillon	18
Athens	20½	Clyde	16½	Greenville	16	Mendon	17
Attica	16½	Coldwater	16	Greenfield	19	Middle Branch	18
Avery	17	Columbiana	19	Hamilton	17	Middleport	21
Barberton	18	Columbus Grove	16	Hamler	16	Middletown	17
Barnesville	21	Columbus	18	Haviland	15	Mineral Ridge	19
Bedford	18	Conneaut	19	Hillsboro	19	Minster	16
Bellaire	21	Coshocton	19	Ironton	20½	Montpelier	13½
Bellefontaine	16	Crestline	16½	Ivorydale	17	Mt. Vernon	18
Bellevue	16	Crooksville	19	Jackson	20½	Napoleon	16
Big Prairie	18	Cuyahoga Falls	18	Kent	18	Nelsonville	20½
Bowling Green	16	Dayton	17	Kenton	16	Newark	18
Bremen	19	Defiance	15	Lakeview	16	New Lexington	19
Bridgeport	21	Delaware	18	Lancaster	19	New Philadelphia	19
Brookville	17	Delphos	15	Leetonia	19	Niles	19
Bryan	15	Dennison	20½	Lexington	18	N. Baltimore	16
Buckland	16	East Liverpool	21	Lima	16	Norwalk	17
Byersville	21	Eaton	16	Lisbon	19	Norwood	17
Bucyrus	16½	Elmwood	17	Logan	20½	Orrville	18
Butler	18	Elyria	18	Lockland	17	Ottawa	16
Caldwell	21	Findlay	16	London	18	Painesville	19
Cambridge	19	Fostoria	16	Lorain	18	Paulding	15
Canal Dover	19	Fremont	16½	Louisville	18	Piqua	16
Canal Fulton	18	Galion	16½	Lowellville	19	Plymouth	19
Canton	18	Gallipolis	21	Mansfield	17	Pomeroy	21
Celina	16			Marietta	21		

OHIO—CONTINUED

	Cents		Cents		Cents		Cents
Port Clinton	17	Shelby	17	Utica	18	W. Alexandria	17
Portsmouth	21	Sidney	16	Uhrichville	20½	N. Manchester	17
Prairie Depot	16	S. Columbus	18	Van Wert	15	Wickliff	19
Ravenna	18	Springfield	17	Wadsworth	18	Wilmington	19
Rockford	16	Steubenville	21	Wapakoneta	16	Wooster	18
Roesford	16	Swanton	16	Warren	19	Xenia	17
St. Marys	16	Tiffin	16	Wauseon	15	Youngstown	19
Salem	19	Toledo	16	Wellston	20½	Zanesville	19
Sandusky	17	Urbana	17	Wellsville	21		

MINNESOTA

	Cents		Cents		Cents		Cents
Albert Lea	25	Fergus Falls	53	Minnesota Transfer	25	Sauk Center	47
Alexandria	49	Fulda	33½	Montendeo	40	Shakopee	25
Anoka	35	Glencoe	33	Moorhead	59	S. St. Paul	25
Appleton	43	Hastings	25	Nashwauk	40½	Spring Valley	25
Austin	25	Hibbing	40½	New Prague	25	Stillwater	25
Bemidji	56	Hill City	54½	New Ulm	29	Thief River Falls	59
Brainard	48	Hopkins	25	Norcross	52	Triumph	30
Buhl	40½	Houston	24	Northfield	25	Virginia	40½
Canby	40	Kassin	25	Owatonna	25	Wabasha	36
Ceylon	30	Kenyon	25	Preston	24	Warren	62
Chisholm	40½	La Crescent	23	Red Wing	25	Waterville	25
Clara City	47	Lake City	25	Rochester	24	Waysata	31
Cloquet	28	Litchfield	43	Rushford	24	Wells	27
Crookston	59	Little Falls	46	St. Cloud	42	Wilmar	45
Duluth	28	Long Prairie	49	St. James	30	Winnebago	30
Ely	45	Luverne	30	St. Louis Park	25	Winona	23
Eveleth	40½	Mankato	27	St. Paul	25	Worthington	32
Fairmont	30	Marshall	39	St. Peter	27	Zumbrota	25
Fairbault	25	Minneapolis	25				

MISSOURI

	Cents		Cents		Cents		Cents
Alexandria	17	De Soto	33	Joplin	45	Nevada	37
Aurora	39	Dexter	46	Kansas City	32	Poplar Bluff	47
Boonville	29	Excelsior Springs	32	Kirkville	27	Rockport	29
Brookfield	30	Flat River	41	Lexington	32	Sedalia	29
Cape Girardeau	34	Fulton	26	Linneus	32	St. Joseph	32
Carrollton	32	Hannibal	17½	Lockwood	37	St. Louis	17½
Carterville	45	Hardin	32	Macon	27	Salisbury	29
Carthage	45	Harrisonville	37	Marceline	30	Springfield	37
Caruthersville	46	Huntsville	27	Marshall	31	Tarkio	32
Charleston	41	Independence	32	Maysville	32	Warrensburg	31½
Chillicothe	32	Jackson	38	Mendota	31	Washington	32
Clarksdale	32	Jefferson City	29	Mexico	26	Webb City	45
Clinton	37			Moberly	26	Westboro	32
Columbia	26					West Plains	48

KANSAS

	Cents		Cents		Cents		Cents
Arkansas City	75	Fredonia	57	Lebanon	68	Pittsburg	45
Ashland	95	Ft. Scott	37	Lyons	72	Pleasanton	37
Atchison	32	Galena	45	Manhattan	53	Pratt	80
Bonner Springs	32	Garden City	85	Marysville	53	Rosedale	32
Cawker City	69	Hiawatha	32	Medicine Lodge	87	Sabetha	36
Chanute	40	Horton	34	Neodesha	55	Salina	64
Chapman	62	Hutchinson	64	Newton	68	Stafford	78
Coffeyville	55	Independence	55	Olathe	37	Tyro	57
Dodge City	85	Iola	45	Oswego	53½	Wellington	75
Eldorado	65	Junction City	60	Ottawa	45	Williamsburg	52
Emporia	55	Kansas City	32	Paola	37	Winfield	73½
Enterprise	57	Larned	84	Parsons	45	Topeka	47
Erie	45	Leavenworth	32			Wichita	69

COLD ROLLED SHAFTING CUTTING LIST FROM WAREHOUSE

ROUNDS

Cold Rolled Shafting Cutting	Extras for Other than Stock Lengths			
Per 100 Pounds, Net	Over 5 Feet	5 Feet to 2 Feet	2 Feet to 1 Foot	Under 1 Foot
¾ to 1 7/16 inches	$0.20	$0.35	$0.40	Special
1½ to 3 inches	.20	.35	.40	"
3 1/16 to 3 7/16 inches	.20	.35	.40	"
3½ to 3 15/16 inches	.20	.35	.40	"
4 inches and over	.20	.35	.40	"

SQUARES AND FLATS

Special prices according to specifications.

SCREW STOCK

Furnished only in stock lengths.

STANDARD VARIATIONS IN SHEARING FROM WAREHOUSE

The variation list shown below governs shearing on warehouse shipments. On direct mill shipments the variation of the mill in question will apply.

Shapes to Specified Lengths	Over	Under
Rounds and Squares up to 2 inches	1/4 inch	1/4 inch
Rounds and Squares, 2 inches to 3 inches, inclusive	3/8 "	3/8 "
Rounds and Squares, 3 inches to 4½ inches, inclusive, up to and including 20 feet long	3/4 "	3/4 "
Rounds and Squares over 3 inches to 4¼ inches, inclusive, over 20 feet long	3/4 "	1 "
Rounds over 4¼ inches to 7¼ inches, inclusive, up to and including 20 feet long	3/4 "	3/4 "
Rounds over 4¼ inches to 7¼ inches, inclusive, over 20 feet long	3/4 "	1¼ "
Flats 1 inch to 3 inches wide, inclusive	1/4 "	1/4 "
Flats over 3 inches to 6 inches, up to and including 20 feet long	3/8 "	3/4 "
Flats over 3 inches to 6 inches wide, over 20 feet long	5/8 "	1¼ "
Shapes up to but not including 3 inches	1/4 "	1/4 "
Structural	**Over**	**Under**
Beams and Channels	3/8 inch	3/8 inch
Angles—Z and other shapes	3/4 "	0 "
Universal Plates, length	3/4 "	0 "
Sheared Plates, length, width	1/4 "	1/4 "

STANDARD STEEL CLASSIFICATION OF EXTRAS ON STEEL BARS AND SMALL SHAPES

ROUNDS AND SQUARES

Small Sizes	Extra per 100 Pounds
3/4 to 3 inches	Base
5/8 to 1 1/16 inch	$0.10
1/2 to 1 9/16 inch	.20
7/16 inch	.40
3/8 inch	.50
11/32 inch	.60
1/4 inch	.70
9/32 inch	.80
1/4 inch	1.00
1 1/64 inch	1.50
7/32 inch	2.00
3/16 inch	2.50

Large Sizes	Extra per 100 Pounds
3 1/8 to 3 9/16 inches	$0.15
3 5/8 to 4 1/16 inches	.25
4 1/8 to 4 9/16 inches	.30
4 5/8 to 5 inches	.40
5 1/8 to 5 1/2 inches	.50
5 5/8 to 6 inches	.75
6 1/8 to 6 1/2 inches	1.00
6 5/8 to 7 1/4 inches	1.25

For intermediate sizes, the next higher extra to be charged.

OVALS

	Extra per 100 Pounds
3/4 to 1 3/4 inches	$0.30
5/8 to 1 1/16 inch	.50
9/16 inch	.60
1/2 inch	.80
7/16 inch	1.00
5/8 inch	1.20

HEXAGONS

	Extra per 100 Pounds
3/4 to 2 1/2 inches	$0.30
5/8 to 1 1/16 inch	.50
1/2 to 1 9/16 inch	.70
7/16 inch	1.10
3/8 inch	1.30
5/16 inch	1.50

For intermediate sizes, the next higher extra to be charged.

HALF OVALS AND HALF ROUNDS

	Extra per 100 Pounds
7/8 to 4 inches x 1/2 inch and thicker	$0.50
7/8 to 4 inches x Nos. 7, 8, 9 and 3/16 inch	.70
7/8 to 4 inches x Nos. 10, 11, 12 and 1/8 inch	1.00
3/4 to 1 1/16 inch x 3/16 inch and thicker	.80
3/4 to 1 1/16 inch x Nos. 10, 11, 12 and 1/8 inch	1.20
3/4 to 1 1/16 inch x Nos. 13, 14 and 15	1.40
5/8 to 1 1/16 inch x 5/32 inch (No. 9) and thicker	1.00
5/8 to 1 1/16 inch x Nos. 10, 11, 12 and 1/8 inch	1.30
5/8 to 1 1/16 inch x Nos. 13, 14 and 15	1.50
1/2 to 1 9/16 inch x 1/8 inch and thicker	1.30
1/2 to 1 9/16 inch x Nos. 13, 14 and 15	1.80
7/16 x 7/64 inch and thicker	2.10
7/16 inch x Nos. 13, 14 and 15	2.30
3/8 x 3/32 inch and thicker	2.50
3/8 inch x Nos. 14 and 15	2.70
5/16 x 5/32 inch and thicker	2.60
5/16 x less than 5/32 inch thick	2.80

FLAT BARS AND HEAVY BANDS

1 to 6 inches x 3/8 to 1 inch	Base
	Extra per 100 Pounds
1 to 6 inches x 1/4 to 5/16 inch	$0.20
11/16 to 1 1/16 inch x 3/8 to 3/4 inch	.40
11/16 to 1 1/16 inch x 1/4 to 5/16 inch	.50
9/16 to 5/8 inch x 3/8 to 1/2 inch	.60
9/16 to 5/8 inch x 1/4 to 5/16 inch	.70

STANDARD STEEL CLASSIFICATION
CONTINUED

FLAT BARS AND HEAVY BANDS—CONTINUED

		Extra per 100 Pounds
½	inch x ⅜ to ⅞ inch	$1.00
½	inch x ¼ to ⅝ inch	1.20
7/16	inch x ⅜ inch	1.40
7/16	inch x ¼ to ⅝ inch	1.60
⅜	inch x ¼ to ⅝ inch	2.00
1⅛ to 6	inches x 1 1/16 to 1 15/16 inches	.10
1⅛ to 6	inches x 1¼ to 1½ inches	.20
1¾ to 6	inches x 1⅝ to 2¾ inches	.30
3⅛ to 6	inches x 3 to 4 inches	.40

For intermediate sizes, the next higher extra to be charged.

LIGHT BARS AND BANDS

		Extra per 100 Pounds
1½ to 6	inches x Nos. 7, 8, 9 and 3/16 inch	$0.40
1½ to 6	inches x Nos. 10, 11, 12 and ⅛ inch	.60
1 to 1 7/16	inches x Nos. 7, 8, 9 and 3/16 inch	.50
1 to 1 7/16	inches x Nos. 10, 11, 12 and ⅛ inch	.70
13/16 to 15/16	inch x Nos. 7, 8, 9 and 3/16 inch	.70
13/16 to 15/16	inch x Nos. 10, 11, 12 and ⅛ inch	.80
11/16 to ¾	inch x Nos. 7, 8, 9 and 3/16 inch	1.00
11/16 to ¾	inch x Nos. 10, 11, 12 and ⅛ inch	1.20
9/16 to ⅝	inch x Nos. 7, 8, 9 and 3/16 inch	1.20
9/16 to ⅝	inch x Nos. 10, 11, 12 and ⅛ inch	1.30
½	inch x Nos. 7, 8, 9 and 3/16 inch	1.30
½	inch x Nos. 10, 11, 12 and ⅛ inch	1.50
7/16	inch x Nos. 7, 8, 9 and 3/16 inch	1.80
7/16	inch x Nos. 10, 11, 12 and ⅛ inch	2.10
⅜	inch x Nos. 7, 8, 9 and 3/16 inch	1.90
⅜	inch x Nos. 10, 11, 12 and ⅛ inch	2.40

For intermediate sizes, the next higher extra to be charged in all cases.

ANGLES

	Extra per 100 Pounds
1½ x 1½ inches and wider, but under 3 inches x 3/16 inch and heavier	$0.20
1½ x 1½ inches and wider, but under 3 inches x ⅛ inch	.30
1 x 1 to 1¼ x 1¼ inches x 3/16 inch and heavier	.30
1 x 1 to 1¼ x 1¼ inches x ⅛ inch	.40
⅞ x ⅞ inch x 3/16 inch	.40
⅞ x ⅞ inch x ⅛ inch	.50
¾ x ¾ inch x 3/16 inch	.50
¾ x ¾ inch x ⅛ inch	.60
⅝ x ⅝ inch x ⅛ inch	2.20
⅝ x ⅝ inch x 3/32 inch	2.60
½ x ½ inch x ⅛ inch	3.20
½ inch x ½ inch less than ⅛ inch	3.60
3 inches on one or both legs by less than ¼ inch thick	.70

Unequal leg angles are subject to special prices, which will be furnished on application.

STANDARD STEEL CLASSIFICATION
CONTINUED

CHANNELS

	Extra per 100 Pounds
1½ inches and wider, but under 3 inches x 3/16 inch and heavier	$0.20
1½ inches and wider, but under 3 inches x 1/8 inch	.30
1 to 1¼ inches x 3/16 inch and heavier	.30
1 to 1¼ inches x 1/8 inch	.40
7/8 x 3/16 inch and heavier	.40
7/8 x 1/8 inch	.50
5/8 to 3/4 inch x 3/16 inch	.50
3/4 x 1/8 inch	.60
5/8 x 1/8 inch	2.20
1/2 x 1/8 inch	3.20
1/2 x less than 1/8 inch	3.60

TEES

	Extra per 100 Pounds
1½ x 1½ inches and wider, but under 3 inches x ¼ inch and heavier	$0.20
1½ x 1½ inches and wider, but under 3 inches x 3/16 inch	.40
1½ x 1½ inches x 1/8 inch	.50
1¼ x 1¼ inches x ¼ inch and heavier	.40
1¼ x 1¼ inches x 3/16 inch	.50
1¼ x 1¼ inches x 1/8 inch	.60
1 x 1 to 1⅛ x 1⅛ inches x 3/16 inch thick	.60
1 x 1 to 1⅛ x 1⅛ inches x 1/8 inch thick	.70
7/8 x 7/8 inch x 1/8 inch and thicker	.90
3/4 x 3/4 inch x 1/8 inch and thicker	1.10
5/8 x 5/8 inch x 1/8 inch and thicker	2.20

Unequal leg tees are subject to special prices, which will be furnished on application.

EXTRAS FOR CUTTING TO SPECIFIED LENGTHS

	Extra per 100 Pounds
Hot sawing or shearing, 24 to 60 inches	$0.10
Hot sawing or shearing, 12 to 24 inches	.20
Shearing, under 12 inches	.30
Machine cutting, specified lengths above 24 inches	.20
Machine cutting, specified lengths, 12 to 24 inches	.40
Machine cutting, specified lengths less than 12 inches, according to contract, but not less than 60 cents on each size.	

No charge for shearing to multiple lengths of 12 inches and under.
No extra charge for hot shearing to lengths of 5 feet and over.

MACHINE STRAIGHTENING AND CENTERING

Machine straightening alone, for ordinary sizes $0.20

Extras for machine straightening and centering, will be furnished on application.

STANDARD STEEL CLASSIFICATION
CONTINUED

FLAT SPRING STEEL
OPEN HEARTH

1¼ inches to 8 inches x No. 4 to ½ inch	Base
	Extra per 100 Pounds
1 inch and 1⅛ inches x Nos. 1 to 4	$0.20
1 inch to 3 inches x Nos. 5 to 7	.50
¾ inch and ⅛ inch x Nos. 1 to 7	.50
⅜ inch to ⅛ inch x Nos. 1 to 7	1.00
¾ inch to 4 inches x Nos. 8 to 10	1.00
¾ inch to 5 inches x Nos. 11 to 16	1.50
¾ inch to 6 inches x Nos. 17 to 19	2.20
¼ inch to ⅝ inch x Nos. 10 to 16	4.00
¼ inch to ⅝ inch x Nos. 17 to 19	5.00

ROUND AND SQUARE SPRING STEEL
OPEN HEARTH

⅝ inch to 1½ inches	Base
	Extra per 100 Pounds
½ inch to $\frac{9}{16}$ inch	$0.20
⅜ inch to $\frac{7}{16}$ inch	.50
$\frac{5}{16}$ inch	1.00
¼ inch	1.50

Cutting to lengths 24 inches and over, ¼ cent per pound. Under 24 inches, special prices.

QUANTITY DIFFERENTIALS

All specifications for less than 2,000 pounds of a size will be subject to the following extras, the total weight of a size ordered to determine the extra, regardless of length and regardless of exact quantity actually shipped.

	Extra per 100 Pounds
Quantities less than 2,000 pounds, but not less than 1,000 pounds	$0.30
Quantities less than 1,000 pounds	.70

GALVANIZED STRAND
SEVEN STEEL WIRES TWISTED INTO A SINGLE STRAND

STANDARD STEEL STRAND

Diameter in Inches	Approximate Weight per 1000 Feet Pounds	Approximate Strength in Pounds	List Prices per 100 Feet	Diameter in Inches	Approximate Weight per 1000 Feet Pounds	Approximate Strength in Pounds	List Prices per 100 Feet
⅝	800	14000	$7.25	$\frac{1}{16}$	75	1400	$1.25
$\frac{11}{16}$	650	11000	5.75	$\frac{9}{64}$	55	900	1.15
½	510	8500	4.50	$\frac{1}{16}$	40	700	1.10
$\frac{7}{16}$	415	6500	3.75	⅛	32	500	1.00
⅜	295	5000	2.75	$\frac{7}{64}$	25	450	.90
$\frac{5}{16}$	210	3800	2.25	$\frac{3}{32}$	20	400	.80
¼	125	2300	1.75	$\frac{5}{64}$	13	300	.70
$\frac{7}{32}$	95	1800	1.50				

STANDARD CLASSIFICATION OF EXTRAS ON STEEL TIRE

1 inch x ¼ inch and heavier	Base

	Extra per 100 Pounds
1½ inches x $\frac{3}{16}$ inch and $\frac{7}{32}$ inch	$0.20
1 inch to 1$\frac{7}{16}$ x $\frac{3}{16}$ and $\frac{7}{32}$ inch	.30
1 inch to 1$\frac{7}{16}$ x ⅛ inch	.50
$\frac{7}{8}$ inch x ¼ inch and $\frac{5}{16}$ inch	.30
$\frac{7}{8}$ inch x $\frac{3}{16}$ and $\frac{7}{32}$ inch	.50
$\frac{7}{8}$ inch x ⅛ and $\frac{5}{32}$ inch	.60
¾ inch x ¼ inch	.30
¾ inch x $\frac{3}{16}$ and $\frac{7}{32}$ inch	.80
¾ inch x ⅛ and $\frac{5}{32}$ inch	1.00
$\frac{5}{8}$ inch x $\frac{3}{16}$ inch	1.00
$\frac{5}{8}$ inch x ⅛ and $\frac{5}{32}$ inch	1.10

For intermediate sizes, the next higher extra to be charged.

Sizes not shown are subject to special arrangement.

QUANTITY DIFFERENTIALS

All specifications for less than 2000 pounds of a size will be subject to the following extras, the total weight of a size ordered to determine the extra, regardless of lengths and of exact quantity actually shipped.

Quantities less than 2000 pounds, but not less than 1000 pounds, $0.30 per 100 pounds. Quantities less than 1000 pounds, $0.70 per 100 pounds.

No extra charge for cutting to tire lengths.

MILL EXTRAS ON STRUCTURAL SHAPES FOR SIZE AND CUTTING

	Extra per 100 Pounds
Angles larger than 6 inches on one or both legs	$0.10
Beams, 18 inch, 20 inch and 24 inch	.10
Cutting to length under 3 feet to 2 feet	.25
Cutting to length under 2 feet to 1 foot	.50
Cutting to length under 1 foot	1.55
Tees, 3 inch and over (except hand rail tees)	.05

STANDARD IRON CLASSIFICATION

FLATS

	Extra per 100 Pounds
1½ to 4 x ⅜ to 1 inch	Base
4¼ to 6 x ⅜ to 1 inch	$0.10
4¼ to 6 x 1/16 to 1½ inches	.40
6¼ to 8 x 1/16 to 1½ inches	.60
6¼ to 8 x ⅝ to 1 inch	.60
8¼ to 10 x ⅜ to 1 inch	.80
1⅜ to 4 x 1⅛ to 1½ inches	.30
2 to 4 x 1⅝ to 2 inches	.50
4¼ to 6 x 1⅝ to 2 inches	.60
6¼ to 8 x 1⅝ to 2 inches	.80
8¼ to 10 x 1/16 to 1½ inches	.90
8¼ to 10 x 1⅝ to 2 inches	1.00
2 to 4 x 2⅛ to 3 inches	.60
4¼ to 6 x 2⅛ to 3 inches	.80
6¼ to 8 x 2⅛ to 3 inches	1.00
1⅛ to 1⅜ x ⅜ to 1 inch	.10
1 to 1 1/16 x ⅜ to ⅞ inch	.20
¾ to 1 1/16 x ⅜ to ¾ inch	.40
⅝ to 1 1/16 x ⅜ to ⅝ inch	.50
½ to 9/16 x ⅜ to ½ inch	.90

ROUNDS AND SQUARES

Extra per 100 Pounds		Extra per 100 Pounds	
1 to 1⅞ inches	Base	¾ to ⅞ inch	$0.10
2 to 2⅞ inches	$0.20	⅝ to 11/16 inch	.20
3 to 3½ inches	.50	½ to 9/16 inch	.30
3⅝ to 4 inches	.80	7/16 to 15/32 inch	.40
4⅛ to 4½ inches	1.00	⅜ to 13/32 inch	.50
4⅝ to 5 inches	1.30	5/16 to 11/32 inch	.70
5⅛ to 6 inches	1.80	¼ to 9/32 inch	.90
6⅛ to 6½ inches	2.20	7/32 inch	1.40
6⅝ to 7¼ inches	2.50	3/16 inch	2.50

HALF OVAL AND HALF ROUND

Extra per 100 Pounds		Extra per 100 Pounds	
2¼ to 3 inches	$0.60	½ to 9/16 inch	$1.20
⅞ to 2 inches	.50	⅜ to 7/16 inch	2.50
¾ to 13/16 inch	.70	5/16 inch	3.50
⅝ to 11/16 inch	.90	¼ inch	4.50

Half ovals, less than ¼ their width in thickness, extra price.

OVAL IRON

Extra per 100 Pounds		Extra per 100 Pounds	
⅞ to 1½ inches	$0.40	⅜ to 7/16 inch	$1.10
¾ to 13/16 inch	.50	½ to 9/16 x 7/16 inch	1.00
⅝ to 11/16 inch	.60	⅝ to 11/16 x ⅛ inch	1.20
½ to 9/16 inch	.80		

STANDARD IRON CLASSIFICATION
CONTINUED

HEAVY IRON BANDS

	Extra per 100 Pounds
8¼ to 10 x ¼ to $\frac{5}{16}$ inch	$0.70
7 to 8 x ¼ to $\frac{5}{16}$ inch	.70
6¼ to 6¾ x ¼ to $\frac{5}{16}$ inch	.50
4¼ to 6 x ¼ to $\frac{5}{16}$ inch	.30
1½ to 4 x ¼ to $\frac{5}{16}$ inch	.20
1 to 1⅜ x ¼ to $\frac{5}{16}$ inch	.30
¾ to $\frac{15}{16}$ x ¼ to $\frac{5}{16}$ inch	.50
⅝ to $\frac{11}{16}$ x ¼ to $\frac{5}{16}$ inch	.80
½ to $\frac{9}{16}$ x ¼ to $\frac{5}{16}$ inch	1.00
⅜ to $\frac{7}{16}$ x ¼ to $\frac{5}{16}$ inch	1.50

BEVEL EDGE BOX IRON

Bevel edge box iron takes the same extras as light bands of same sizes.

	Extra per 100 Pounds
Beaded band iron, 1¼ inches to 2 inches	$0.70

Sand band iron, 10 cents above light bands.

LIGHT BANDS

	Extra per 100 Pounds
7 to 8 x Nos. 9 to $\frac{3}{16}$	$0.90
7 to 8 x Nos. 10, 11, 12	1.00
6¼ to 6¾ x No. 9 to $\frac{3}{16}$	.70
6¼ to 6¾ x Nos. 10, 11, 12	.80
4¼ to 6 x No. 9 to $\frac{3}{16}$	.50
4¼ to 6 x Nos. 10, 11, 12	.60
1¼ to 4 x No. 9 to $\frac{3}{16}$	.40
1¼ to 4 x Nos. 10, 11, 12	.50
1 to 1⅜ x No. 9 to $\frac{3}{16}$	.50
1 to 1⅜ x Nos. 10, 11, 12	.60
$\frac{13}{16}$ to ⅞ x No. 9 to $\frac{3}{16}$	.60
$\frac{13}{16}$ to ⅞ x Nos. 10, 11, 12	.70
$\frac{11}{16}$ to ¾ x No. 9 to $\frac{3}{16}$	.80
$\frac{11}{16}$ to ¾ x Nos. 10, 11, 12	.90
$\frac{9}{16}$ to ⅝ x No. 9 to $\frac{3}{16}$	1.00
$\frac{9}{16}$ to ⅝ x Nos. 10, 11, 12	1.10
$\frac{7}{16}$ to ½ x No. 9 to $\frac{3}{16}$	1.30
$\frac{7}{16}$ to ½ x Nos. 10, 11, 12	1.40
⅜ x No. 9 to $\frac{3}{16}$	1.50
⅜ x Nos. 10, 11, 12	1.60

CLASSIFICATION OF SWEDISH OR NORWAY IRON

ROUNDS AND SQUARES

1 to 1 7/8 inches	Base

Extra per 100 Pounds	
2 to 2 5/8 inches	$0.10
2 3/4 to 3 1/4 inches	.20
3 1/2 to 4 inches	.50
3/4 to 7/8 inch	.10
9/16 to 5/8 inch	.20
7/16 to 1/2 inch	.30
3/8 inch	.40
5/16 inch	.60
1/4 inch	1.00
3/16 inch	1.50

FLATS

1 1/2 to 4 x 3/8 to 1 inch thick	Base

Extra per 100 Pounds	
4 1/4 to 6 x 3/8 to 1 inch thick	$0.10
1 3/4 to 6 x 1 1/8 to 1 1/2 inches thick	.20
2 1/2 to 6 x 2 inches thick	.50
1 1/4 and 1 3/8 x 3/8 to 1 inch	.10
1 and 1 1/8 x 3/8 to 7/8 inch	.20
1/2, 5/8, 3/4 and 7/8 x 3/8 to 5/8 inch thick	.40
1 1/2 to 6 x 1/4 and 5/16 inch	.20
1 to 1 3/8 x 1/4 and 5/16 inch	.30
3/4 and 7/8 x 1/4 and 5/16 inch	.50
1/2 and 5/8 x 1/4 and 5/16 inch	1.00
1 to 2 x 3/16 inch	.50
3/4 and 7/8 x 3/16 inch	.80
1/2 and 5/8 x 3/16 inch	1.20

STONE AND MARBLE SAW BLADES

Carefully cut to length and straightened.

Extra per 100 Pounds for less than carload	
1 1/2 to 7 inches, Nos. 7, 8, 9 or 3/16 inch	$0.10
1 1/2 to 7 inches, Nos. 10, 11, 12 or 1/8 inch	.15

Regular extras as per Standard Bar Steel Classification to apply, in addition to the above.

SOFT STEEL HOOP EXTRAS

Width, Inches	Gauge	Extra, 100 lbs.	Width, Inches	Gauge	Extra, 100 lbs.	Width, Inches	Gauge	Extra, 100 lbs.
3/8	13	$1.10	1 1/4	21	$0.90	1 1/2 to 2	19	$0.25
"	14	1.10	"	22	1.05	"	20	.50
"	15	1.20	"	23	1.25	"	21	.70
"	16	1.30	3/4 to 1 1/4	13	.40	"	22	.95
"	17	1.45	"	14	.40	2 1/2 to 2 1/2	13	.10
"	18	1.60	"	15	.40	"	14	.10
1/2	13	.90	"	16	.50	"	15	.10
"	14	.90	"	17	.50	"	16	.15
"	15	.90	"	18	.55	"	17	.20
"	16	1.00	"	19	.60	"	18	.30
"	17	1.10	"	20	.65	"	19	.40
"	18	1.35	"	21	.75	"	20	.60
"	19	1.50	"	22	.95	"	21	.90
1/2	13	.65	"	23	1.20	2 1/2 to 3	13	.10
"	14	.65	7/8	13	.30	"	14	.10
"	15	.65	"	14	.30	"	15	.10
"	16	.75	"	15	.30	"	16	.15
"	17	.75	"	16	.35	"	17	.20
"	18	.80	"	17	.40	"	18	.30
"	19	.85	"	18	.40	"	19	.40
"	20	.95	"	19	.45	"	20	.60
"	21	1.15	"	20	.55	"	21	1.00
"	22	1.35	"	21	.65	3 1/2 to 3 1/2	13	.10
9/16	13	.55	"	22	.85	"	14	.15
"	14	.55	"	23	1.10	"	15	.20
"	15	.55	1 1/4 to 1	13	.20	"	16	.30
"	16	.65	"	14	.20	"	17	.40
"	17	.65	"	15	.20	"	18	.55
"	18	.70	"	16	.25	"	19	.75
"	19	.75	"	17	.25	"	20	1.00
"	20	.85	"	18	.30	3 1/2 to 4	13	.10
"	21	1.00	"	19	.35	"	14	.15
"	22	1.15	"	20	.45	"	15	.20
"	23	1.35	"	21	.65	"	16	.30
5/8	13	.50	"	22	.85	"	17	.45
"	14	.50	"	23	1.10	"	18	.70
"	15	.50	1 1/4 to 1 3/8	13	.15	"	19	.90
"	16	.60	"	14	.15	4 1/2 to 5	13	.15
"	17	.60	"	15	.15	"	14	.20
"	18	.65	"	16	.20	"	15	.30
"	19	.70	"	17	.25	"	16	.50
"	20	.80	"	18	.25	"	17	.75
"	21	.95	"	19	.30	5 1/8 to 5 7/8	13	.20
"	22	1.10	"	20	.45	"	14	.30
"	23	1.30	"	21	.65	"	15	.50
11/16	13	.45	"	22	.85	"	16	.80
"	14	.45	1 1/2 to 2	13	.10	6 to 6 3/4	13	.30
"	15	.45	"	14	.10	"	14	.40
"	16	.55	"	15	.10	"	15	.60
"	17	.55	"	16	.10	"	16	.90
"	18	.60	"	17	.15	7 to 8 5/8	13	.35
"	19	.65	"	18	.20	"	14	.50
"	20	.75						

NOTES—Throughout this list Birmingham Wire Gauge and the corresponding decimal equivalents apply. Per 100 pounds

ADDITIONAL EXTRAS—For cutting to specified lengths not less than 24 inches.....$0.05
For cutting to specified lengths 12 inches to 24 inches..... .20

Extra for cutting to specified lengths less than 12 inches will be furnished on application.

Per 100 pounds Per 100 pounds
For rounding one end of cut hoop...$0.05 For rounding both ends of cut hoop..$0.10

For intermediate gauges the extra for the next lighter gauge will be charged.

Rolling of lighter gauges than indicated on the list and the extras to apply are subject to special arrangements. Extras for flaring and galvanising will be quoted on application.

Extras for packing in barrels, casks and boxes will be quoted on application.

EXEMPTION—Extras for cutting and rounding one end will be waived on all widths when ordered in carload lots for cooperage purposes.

COLD ROLLED STRIP STEEL MILL EXTRAS

SPECIAL EXTRAS FOR EXTRA WIDE THIN SIZES

	Per cwt.
Wider than 6 inches to 9 inches, inclusive, x .025 and thinner	$0.25
Wider than 9 inches x .025 and thinner	.50
Wider than 9 inches to 12 inches, inclusive, x .026 to .035, inclusive	.25
Wider than 12 inches x .026 to .035, inclusive	.50

EXTRAS FOR NARROW WIDTHS IN COILS

	Per cwt.
Narrower than 1½ inches to 1 inch, inclusive	$0.15
Narrower than 1 inch to ⅜ inch, inclusive	.30

EXTRAS FOR NARROW WIDTHS IN FLAT STRIPS

	Per cwt.
Narrower than 1½ inches to 1 inch, inclusive (ALL GAUGES)	$0.15
Narrower than 1 inch to ⅜ inch, inclusive, .100 and thicker	.45
Narrower than 1 inch to ⅜ inch, inclusive, .035 to .099, inclusive	.65
Narrower than 1 inch to ⅜ inch, inclusive, .031 to .034, inclusive	.80
Narrower than 1 inch to ⅜ inch, inclusive, .025 to .030, inclusive	.65
Narrower than 1 inch to ⅜ inch, inclusive, .020 to .024, inclusive	.55

EXTRA FOR CUTTING TO LENGTH

	Per cwt.
Any width and thickness shorter than 24 inches	$0.25

On orders or contracts for less than 18 tons, quantity extras will be charged as follows:

	Per cwt.
6000 pounds to 18 tons of one size	$0.10
2000 pounds to 5999 pounds of one size	.25
1000 pounds to 1999 pounds of one size	.40
500 pounds to 999 pounds of one size	.55
300 pounds to 499 pounds of one size	.75
200 pounds to 299 pounds of one size	.95
100 pounds to 199 pounds of one size	1.45
50 pounds to 99 pounds of one size	3.45

REDUCTION FOR QUANTITY

All sizes when ordered in 18 tons or more of one size for shipment at one time, 15 cents per 100 pounds less.

STOCK EXTRAS

For shipment from stock, there is a standard warehousing extra.

Sheared widths and lengths can be furnished from stock at a reasonable advance based on the time consumed in shearing stock strips.

For sizes carried in stock, see page 118.

STANDARD SHAFTING PRICE LIST

ROUNDS

Diam.	Price per Pound	Diam.	Price per Pound	Diam.	Price per Pound	Diam.	Price per Pound
1/8	$0.12	1 5/16	$0.05 1/2	2 1/2	$0.05	3 1/16	$0.05 1/2
3/16	.10	1 3/8	.05 1/2	2 9/16	.05	3 3/4	.05 1/2
1/4	.10	1 7/16	.05 1/2	2 5/8	.05	3 7/8	.05 1/2
5/16	.08 1/2	1 1/2	.05	2 11/16	.05	3 15/16	.05 1/2
3/8	.07	1 9/16	.05	2 3/4	.05	4	.06
7/16	.07	1 5/8	.05	2 13/16	.05	4 1/16	.06
1/2	.07	1 11/16	.05	2 7/8	.05	4 1/4	.06
9/16	.06	1 3/4	.05	2 15/16	.05	4 7/16	.06
5/8	.06	1 13/16	.05	3	.05	4 1/2	.06 1/2
11/16	.06	1 7/8	.05	3 1/16	.05 1/4	4 3/4	.06 1/2
3/4	.05 1/2	1 15/16	.05	3 1/8	.05 1/4	4 15/16	.06 1/2
13/16	.05 1/2	2	.05	3 3/16	.05 1/4	5	.07
7/8	.05 1/2	2 1/16	.05	3 1/4	.05 1/4	5 1/4	.07
15/16	.05 1/2	2 1/8	.05	3 5/16	.05 1/4	5 7/16	.07
1	.05 1/2	2 3/16	.05	3 3/8	.05 1/4	5 1/2	.07 1/2
1 1/16	.05 1/2	2 1/4	.05	3 7/16	.05 1/4	5 3/4	.07 1/2
1 1/8	.05 1/2	2 5/16	.05	3 1/2	.05 1/2	5 15/16	.07 1/2
1 3/16	.05 1/2	2 3/8	.05	3 9/16	.05 1/2	6	.08
1 1/4	.05 1/2	2 7/16	.05	3 5/8	.05 1/2	7	.08

SQUARES AND HEXAGONS

Square — Price per Pound	Size	Hexagon — Price per Pound	Square — Price per Pound	Size	Hexagon — Price per Pound	Square — Price per Pound	Size	Hexagon — Price per Pound
$0.12	1/4	$0.10	$0.08	1 3/16	$0.07	$0.08	2 1/16	$0.08
.12	5/16	.10	.08	1 1/4	.07	.08	2 1/8	.08
.12	3/8	.08	.08	1 5/16	.07	.08	2 3/16	.08
.12	7/16	.08	.08	1 3/8	.07	.08	2 1/4	.08
.10	1/2	.08	.08	1 7/16	.07	.08	2 5/16	.08
.10	9/16	.07 1/2	.08	1 1/2	.07	.08	2 3/8	.08
.10	5/8	.07 1/2	.08	1 9/16	.07	.08	2 7/16	.08
.10	11/16	.07 1/2	.08	1 5/8	.07	.08	2 1/2	.09
.08	3/4	.07 1/2	.08	1 11/16	.07	.08	2 5/8	.09
.08	13/16	.07 1/2	.08	1 3/4	.07	.08	2 3/4	.09
.08	7/8	.07	.08	1 13/16	.07	.08	2 15/16	.09
.08	15/16	.07	.08	1 7/8	.07	.08	3	.09
.08	1	.07	.08	1 15/16	.07	.10	3 1/2	
.08	1 1/8	.07	.08	2	.07	.10	3 1/4	

STANDARD SHAFTING PRICE LIST

FLAT SHAFTING

Thickness, Inches	Width, Inches									
	1/16 to 1/2	5/16 to 11/16	3/4 to 1	1 1/16 to 1 1/2	1 5/16 to 1 3/4	1 11/16 to 2	2 1/16 to 2 1/4	2 5/16 to 2 1/2	2 5/16 to 2 3/4	2 11/16 to 3
1/8 and 5/32	16	16	12	12	10	10	10	10	10	10
3/16 to 5/16	14	14	10	10	8	8	8	8	8	8
3/8 and 7/16	14	14	10	10	8	8	8	8	8	8
1/2 and 9/16	....	10	8	8	8	8	8	8	8	8
5/8 and 11/16	....	10	8	8	8	8	8	8	8	8
3/4 to 15/16	....	....	8	8	8	8	8	8	8	8
1 to 1 1/16	....	....	....	8	8	8	8	8	8	8
1 1/2 to 1 11/16	....	....	....	....	8	8	8	8	8	8
1 3/4 to 1 15/16	....	....	....	....	....	8	8	8	8	8
2 to 2 1/16	....	....	....	....	....	....	8	8	8	8
2 1/4 to 2 5/16	....	....	....	....	....	....	....	8	8	8
2 1/2 to 2 11/16	....	....	....	....	....	....	....	....	8	8
2 3/4 to 2 15/16	....	....	....	....	....	....	....	....	....	8

Widths over 3 inches; list price, 10 cents.

The above prices are for bars from 1 to 24 feet long, inclusive. Fractional or decimal sizes can be furnished promptly from mill.

NET CUTTING EXTRAS—COLD ROLLED STEEL

ROUNDS

3 inches to 5 1/16 inches long, net extra per pound.....1 cent
6 inches to 11 1/16 inches long, net extra per pound..... 1/2 cent
12 inches to 23 1/16 inches long, net extra per pound..... 1/4 cent
24 inches to 59 1/16 inches long net extra per pound..... 1/10 cent

Shorter than 3 inches a special price will be quoted upon application.

Over 24 feet and less than 30 feet, net extra per pound.... 1/2 cent
30 feet and less than 35 feet, net extra per pound.....1 cent
35 feet and less than 40 feet, net extra per pound.....1 1/2 cents
40 feet and less than 45 feet, net extra per pound.....2 cents
45 feet and over, net extra per pound.....2 1/2 cents

Boxing at cost.

SQUARES AND FLATS

	Square	Flat
3 inches to 5 1/16 inches long, net extra per pound.	1 cent	2 cents
6 inches to 11 1/16 inches long, net extra per pound.	1/2 cent	1 cent
12 inches to 23 1/16 inches long, net extra per pound.	1/2 cent	1/2 cent
24 inches to 59 1/16 inches long, net extra per pound.	1/4 cent	1/4 cent

Shorter than 3 inches, special prices will be quoted.

Longer than 24 feet, same extras as long lengths of round shafting.

HALF ROUNDS

1/4 inch to 1/2 inch, per pound.....16 cents
1/2 inch to 1 1/16 inch, per pound.....14 cents
9/16 inch to 1 1/16 inch, per pound.....12 cents
1 1/16 inches to 2 inches, per pound.....10 cents

Above for lengths 5 feet to 24 feet, cutting extras, same as flats.

HEXAGONS

3 inches to 5 1/16 inches long, net extra per pound.....1 cent
6 inches to 11 1/16 inches long, net extra per pound..... 1/2 cent
12 inches to 23 1/16 inches long, net extra per pound..... 1/4 cent
24 inches to 59 1/16 inches long, net extra per pound..... 1/10 cent

For lengths shorter than 3 inches, special prices will be quoted.

STANDARD STEEL PLATE EXTRAS

Steel plates ¼ inch thick and thicker, rectangular shapes, 100 inches wide down to but not including 6 inches wide, of tank, ship or bridge quality, thickness being determined by Birmingham gauge on edge of plates—Base Price.

Steel plates up to 72 inches wide, inclusive, ordered 10.2 pounds per square foot shall be considered ¼ inch plate. Steel plates over 72 inches wide must be ordered ¼ inch thick on edge or not less than 11 pounds per square foot to take base price. Steel plates over 72 inches wide ordered less than 11 pounds per square foot down to the weight of $\frac{3}{16}$ inch shall take the price of $\frac{3}{16}$ inch.

Percentages as to overweight on plates, whether ordered to gauge or weight, to be governed by the Association of American Steel Manufacturers' standard specifications.

Gauges lighter than ¼ in. to and including $\frac{3}{16}$ in. plates, on thin edges	Per 100 lbs.	extra	$0.10
Gauges No. 7 and No. 8	"	"	.15
Gauge No. 9	"	"	.25
Plates over 100 in. to 110 in. wide	"	"	.05
Plates over 110 in. to 115 in. wide	"	"	.10
Plates over 115 in. to 120 in. wide	"	"	.15
Plates over 120 in. to 125 in. wide	"	"	.25
Plates over 125 in. to 130 in. wide	"	"	.50
Plates over 130 in. wide	"	"	1.00
Sketches, except wasteful and expensive cuts, which are subject to special agreement	"	"	.10
Complete Circles, 36 in. to 100 in	"	"	.20
Complete Circles, under 36 in. to 24 in	"	"	.25
Complete Circles, under 24 in. to 12 in	"	"	.50
Complete Circles, under 12 in	"	"	1.55
Cutting to length under 3 ft. to 2 ft	"	"	.25
Cutting to length under 2 ft. to 1 ft	"	"	.50
Cutting to length under 1 ft	"	"	1.55
Boiler and Flange Steel Plates	"	"	.10
"A. B. M. A." and ordinary fire-box steel plates	"	"	.20
Still Bottom Steel	"	"	.30
Marine Steel Plates	"	"	.40

For Allowance for Overweight and Variations when ordered to gauge or weight, see page 843.

PRICES FOR DISHING HEADS

ADOPTED AS STANDARD BY THE STEEL PLATE MANUFACTURERS, APRIL 4, 1901

Outside Diameter when Flanged Inches,	Maximum Depth of Dish, Inches	Thickness of Heads in Inches							
		3/16 and 1/4	3/16 and 5/16	3/16 and 1/2	3/16 and 5/8	11/16 and 3/4	11/16 and 7/8	11/16 and 1	1 1/8 and 1 1/4
12	1 5/8	$ 1.30	$ 1.30	$ 1.30	.....	.....	.....	.....	.....
15	2	1.30	1.30	1.30	.....	.....	.....	.....	.....
18	2 3/8	1.30	1.30	1.30	$ 1.30	.....	.....	.....	.....
24	3 1/4	1.50	1.30	1.50	1.50	$ 2.00	.....	.....	.....
30	4	1.80	1.50	1.80	1.90	2.50	$ 3.00	.....	.....
36	4 3/4	2.30	1.90	2.30	2.50	3.00	4.00	.....	.....
42	5 5/8	2.80	2.30	2.80	3.10	4.00	5.00	$ 6.00	$ 7.00
48	6 3/8	3.50	2.80	3.50	4.00	5.00	6.00	7.00	8.5
54	7 1/4	4.50	3.50	4.50	5.00	7.00	8.50	10.00	12.6
60	8	6.50	4.50	6.50	7.00	9.00	11.00	13.00	15.50
66	9	8.50	6.00	8.50	9.00	12.00	14.00	16.00	19.00
72	9 5/8	10.50	7.50	10.50	11.00	15.00	17.00	19.00	22.50
78	11 1/2	13.00	9.50	13.00	14.00	18.00	20.00	22.00	26.00
84	12 1/2	15.50	12.00	15.50	17.00	21.00	23.00	25.00	29.50
90	13	18.00	15.00	18.00	20.00	24.00	27.00	30.00	35.00
96	14	22.00	18.00	22.00	24.00	28.00	32.00	36.00	41.00
102	15	.....	22.00	27.00	29.00	33.00	37.00	42.00	48.00
108	16	.....	27.00	33.00	34.00	38.00	43.00	48.00	55.00
114	17	.....	33.00	39.00	40.00	44.00	49.00	54.00	62.00
120	18	.....	.....	46.00	47.00	51.00	56.00	61.00	69.00
126	19	.....	.....	55.00	56.00	60.00	65.00	70.00	78.00
132	20	.....	.....	67.00	68.00	72.00	77.00	82.00	90.00

Above list subject to current discounts which will be furnished on application.

Intermediate sizes and depth of dish varying from above will be quoted on upon inquiry, but in no case less than the next size greater on list. These prices do not include flanging—simply dishing.

PRICES FOR FLANGING HEADS

ADOPTED AS STANDARD BY THE STEEL PLATE MANUFACTURERS, APRIL 4, 1901

Outside Diameter in Inches	Thickness of Heads in Inches								
	3/16	1/4	5/16 and 3/8	7/16 and 1/2	9/16 and 5/8	11/16 and 3/4	13/16 and 7/8	15/16 and 1	1 1/8 and 1 1/4
12 to 17 1/8	$1.00	$1.00	$1.00	$1.00	$1.00	.....	.....	.....	.....
18 " 23 1/8	1.00	1.00	1.00	1.00	1.00	$1.50	.....	.....	.....
24 " 29 1/8	1.00	1.00	1.00	1.00	1.20	1.80	$2.00	.....	.....
30 " 35 1/8	1.20	1.20	1.10	1.20	1.70	2.30	2.70	.....	.....
36 " 41 1/8	1.60	1.60	1.40	1.60	2.30	2.90	3.50	$4.20	$5.30
42 " 47 1/8	2.00	2.00	1.80	2.00	3.00	3.70	4.40	5.40	6.70
48 " 53 1/8	3.00	2.70	2.40	2.70	3.70	4.70	5.50	6.80	8.40
54 " 59 1/8	4.00	3.50	3.00	3.50	4.40	6.00	6.90	8.50	10.20
60 " 65 1/8	.....	4.30	3.70	4.30	5.50	7.30	8.40	10.20	12.00
66 " 71 1/8	.....	5.50	4.50	5.50	6.70	8.60	9.90	11.90	13.80
72 " 77 1/8	.....	6.80	5.50	6.80	8.00	9.90	11.50	13.70	15.90
78 " 83 1/8	.....	8.20	6.80	8.20	9.40	11.20	13.20	15.70	18.30
84 " 89 1/8	.....	10.00	8.30	10.00	11.00	12.50	15.00	18.00	21.00
90 " 95 1/8	.....	12.20	10.10	12.20	14.30	16.50	18.20	20.30	24.00
96 " 101 1/8	.....	15.50	12.10	15.50	17.60	20.50	22.60	25.50	29.00
102 " 107 1/8	.....	.....	15.00	19.00	21.00	25.00	27.00	30.00	34.00
108 " 119 1/8	.....	.....	18.00	23.00	26.00	30.00	33.00	36.00	41.00
120 " 127 1/8	.....	.....	.....	27.00	31.00	35.00	39.00	43.00	49.00
128 " 133 1/8	.....	.....	.....	32.00	36.00	41.00	45.00	50.00	57.00
134 " 139 1/8	.....	.....	.....	37.00	41.00	47.00	51.00	57.00	65.00
140 " 143 1/8	.....	.....	.....	42.00	46.00	53.00	57.00	64.00	75.00
Total Depth.....	2"	3"	4"	4 1/2"	5"	5 1/2"	6"	6 1/2"	7"

Above list subject to current discounts, which will be furnished on application.

Where the total depth, including metal, radius and straight flange, exceeds the normal total depth given above, 10 per cent to be added to list for each additional 1/2 inch or fraction thereof.

PRICES FOR FLANGING FLUE HOLES

PRICES ADOPTED AS STANDARD BY STEEL PLATE MANUFACTURERS, APRIL 4, 1901

Inside Diameter of Flue Hole	Thickness of Heads				
	1/4 to 1/2 Inch	9/16 and 5/8 Inch	11/16 and 3/4 Inch	13/16 and 7/8 Inch	15/16 and 1 Inch
6 inch	$ 2.00	$ 2.50	$ 4.00	$ 5.00	$ 6.00
7, 8 and 9 inch	2.50	3.50	4.50	6.00	7.00
10, 11 and 12 inch	3.00	4.00	5.00	7.00	8.00
13, 14, 15 and 16 inch	3.50	4.50	6.00	8.00	9.00
17, 18, 19 and 20 inch	4.00	5.00	7.00	9.00	11.00
22 to 24 inch	4.50	6.00	8.00	10.00	13.00
26 to 28 inch	5.00	7.00	9.00	12.00	16.00
30 to 32 inch	6.00	8.00	11.00	15.00	19.00
34 to 36 inch	7.00	9.00	13.00	18.00	22.00
38 to 40 inch	8.00	11.00	15.00	21.00	26.00
42 to 44 inch	9.00	13.00	18.00	24.00	30.00
46 to 48 inch	10.00	16.00	21.00	28.00	35.00
50 to 52 inch	12.00	19.00	25.00	33.00	40.00
54 to 56 inch	15.00	22.00	29.00	38.00	45.00
58 to 60 inch	18.00	26.00	33.00	43.00	51.00

Material punched out of centers to be retained by manufacturers.

Sizes other than those shown to be quoted on, but in no case price to be less than price of size immediately above same on list. An extra charge may have to be made in case holes are to be flanged in very heavy plates, which would entail extra expense for handling.

The above list does not apply to collar flanges.

PRICE OF DRILLING FLUE HOLES

Diameter of Hole in Inches	Thickness of Plates in Inches		
	1/4 to 5/16 Each	3/8 to 1/2 Each	9/16 to 5/8 Each
1 3/4 to 2 inches	$0.06	$0.06	$0.06
2 1/4 to 2 1/2 inches	.07	.07	.07
2 3/4 to 3 inches	.08	.08	.08
3 1/4 to 3 1/2 inches	.11	.11	.11
3 3/4 to 4 inches	.13 1/2	.13 1/2	.13 1/2
4 1/2 inches	.15	.15	.15

PRICE OF PUNCHING FLUE HOLES

Diameter of Hole in Inches	Thickness of Plates in Inches		
	1/4 to 5/16 Each	3/8 to 1/2 Each	9/16 to 5/8 Each
2 to 2 1/2 inches	$0.04	$0.05	$0.06
2 3/4 to 3 inches	.05	.06	.08
3 1/4 to 3 1/2 inches	.06	.07	.09
3 3/4 to 4 inches	.07	.08	.09
4 1/2 inches	.07 1/2	.08 1/2	.10

For prices on Flanged Manholes and Handholes, see pages 412 to 414.

PRICE LIST STANDARD STEEL AND CHARCOAL IRON TUBES

Outside Diameter Inches	Price per Foot	Birmingham Gauge	Thickness Inches	Weight per Foot Pounds Nominal	Heat Surface in Feet per Foot of Tube	1 Extra Wire Gauge		2 Extra Wire Gauges		3 Extra Wire Gauges		4 Extra Wire Gauges	
						Iron	Steel	Iron	Steel	Iron	Steel	Iron	Steel
1	$0.30	13	.095	.90	.2618	$0.35	$0.35	$0.38	$0.38	$0.42	$0.42	$0.45	$0.45
1¼	.28	13	.095	1.15	.3272	.33	.33	.36	.36	.39	.39	.43	.43
1½	.27	13	.095	1.40	.3927	.32	.32	.34	.34	.38	.38	.42	.42
1¾	.22	13	.095	1.679	.4581	.26	.26	.30	.28	.33	.31	.36	.34
2	.20	13	.095	1.932	.5236	.24	.22	.28	.24	.32	.27	.36	.29
2¼	.22	13	.095	2.186	.5891	.27	.25	.31	.28	.35	.30	.38	.33
2½	.28	12	.109	2.783	.6545	.34	.31	.39	.34	.44	.37	.49	.41
2¾	.31	12	.109	3.074	.7200	.38	.34	.44	.38	.51	.42	.57	.46
3	.34	12	.109	3.365	.7854	.41	.37	.48	.41	.55	.45	.62	.50
3¼	.40	11	.120	4.011	.8508	.48	.45	.55	.50	.63	.55	.70	.59
3½	.43	11	.120	4.331	.9163	.52	.49	.60	.53	.68	.59	.76	.64
3¾	.47	11	.120	4.652	.9818	.56	.52	.65	.57	.73	.63	.82	.69
4	.55	10	.134	5.532	1.0472	.65	.61	.74	.68	.83	.74	.92	.83
4½	.62	10	.134	6.248	1.1781	.73	.69	.83	.77	.94	.83	1.04	.93
5	.76	9	.148	7.669	1.3090	.88	.86	1.00	.93	1.10	1.04	1.23	1.13
6	1.02	8	.165	10.282	1.5708	1.12	1.12	1.26	1.26	1.36	1.36	1.47	1.47
7	1.20	8	.165	12.044	1.8326	1.32	1.32	1.48	1.48	1.60	1.60	1.72	1.72
8	1.38	8	.165	13.807	2.0944	1.50	1.50	1.69	1.69	1.83	1.83	1.97	1.97
9	1.70	7	.180	16.955	2.3562	1.91	1.91	2.07	2.07	2.23	2.23	2.42	2.42
10	2.12	6	.203	21.240	2.6180	2.30	2.30	2.49	2.49	2.70	2.70	2.95	2.95
11	2.53	5	.220	25.329	2.8798	2.74	2.74	2.98	2.98	3.26	3.26	3.43	3.43
12	2.88	....	.229	28.788	3.1416	3.12	3.12	3.40	3.40	3.65	3.65	4.00	4.00
13	3.24	4	.238	32.439	3.4034	3.53	3.53	3.86	3.86	4.07	4.07	4.60	4.60

Tubes more than four gauges heavier than Standard will be charged per pound.

Boiler Tubes to Master Mechanics Association, United States Navy, or other similar severe specifications, special prices on application.

2½ inch and smaller over 18 feet, 10 per cent net extra.

2¾ inch and larger over 22 feet, 10 per cent net extra.

THREADING STAY TUBES

In threading 2¾ inch and smaller tubes for a length up to 3 inches, 12 cents per end. For threading 3 inch to 5 inch, inclusive, tubes for length up to 3 inches 20 cents per end. Longer threads in the same proportion.

For stock, see pages 401 and 403.

EXTRAS FOR WIDTHS AND LENGTHS
BLACK STEEL SHEETS

WIDTHS

No. 16 and heavier.		15 in. and wider	No extra	
No. 16 and heavier.	Under	15 in. to 12 in.	Per 100 lbs. extra	$0.05
		12 in. to 6 in.	" "	.10
No. 17 and 18.		20 in. to 36 in.	No extra	
	Over	36 in. to 48 in.	Per 100 lbs. extra	$0.05
	Over	48 in.	" "	.10
	Under	20 in. to 12 in.	" "	.05
	"	12 in. to 6 in.	" "	.10
No. 19 and lighter.	"	24 in. to 12 in.	" "	.10
	"	12 in. to 6 in.	" "	.20
No. 19 to 21.	Over	32 in. to 36 in.	No extra	
	"	36 in. to 44 in.	Per 100 lbs. extra	$0.15
	"	44 in. to 48 in.	" "	.25
No. 22 to 24.	"	32 in. to 36 in.	No extra	
	"	36 in. to 40 in.	Per 100 lbs. extra	$0.20
	"	40 in. to 48 in.	" "	.40
No. 25 and 26.	"	32 in. to 36 in.	No extra	
	"	36 in. to 40 in.	Per 100 lbs. extra	$0.20
	"	40 in. to 44 in.	" "	.40
No. 27.	"	32 in. to 36 in.	No extra	
	"	36 in. to 40 in.	Per 100 lbs. extra	$0.20
	"	40 in. to 44 in.	" "	.40
No. 28.	"	32 in. to 36 in.	" "	.10
	"	36 in. to 40 in.	" "	.40
No. 29 and 30.	"	32 in. to 36 in.	" "	.10

LENGTHS

No. 16 and heavier.		40 in. and longer	No extra	
No. 16 and heavier.	Under	40 in. to 30 in.	Per 100 lbs. extra	$0.05
	"	30 in. to 18 in.	" "	.10
No. 17 and 18.		48 in. to 144 in.	No extra	
	Over	144 in.	Per 100 lbs. extra	$0.10
	Under	48 in. to 30 in.	" "	.05
	"	30 in. to 18 in.	" "	.10
No. 19 and lighter.		60 in. to 132 in.	No extra	
	Over	132 in. to 144 in.	Per 100 lbs. extra	$0.10
	Under	60 in. to 30 in.	" "	.10
	"	30 in. to 18 in.	" "	.20
Orders for less than 10 bundles or 1500 lbs. of one commodity			" "	.10
Odd sizes when ordered in lots of less than 4000 lbs. of a size			" "	.10

Extras for Quality on next page.

EXTRAS FOR QUALITY—BLACK STEEL SHEETS

Three Pass, cold rolled and annealed	Per 100 lbs. extra		$0.10
Single Pickled, cold rolled and annealed	"	"	.30
Full Pickled, cold rolled and annealed	"	"	.50
Roller leveling and re-squaring	"	"	.10
Patent leveling and re-squaring	"	"	.35
Uniform blue	"	"	.10
Skeleton crating	"	"	.25
Full boxing	"	"	.40

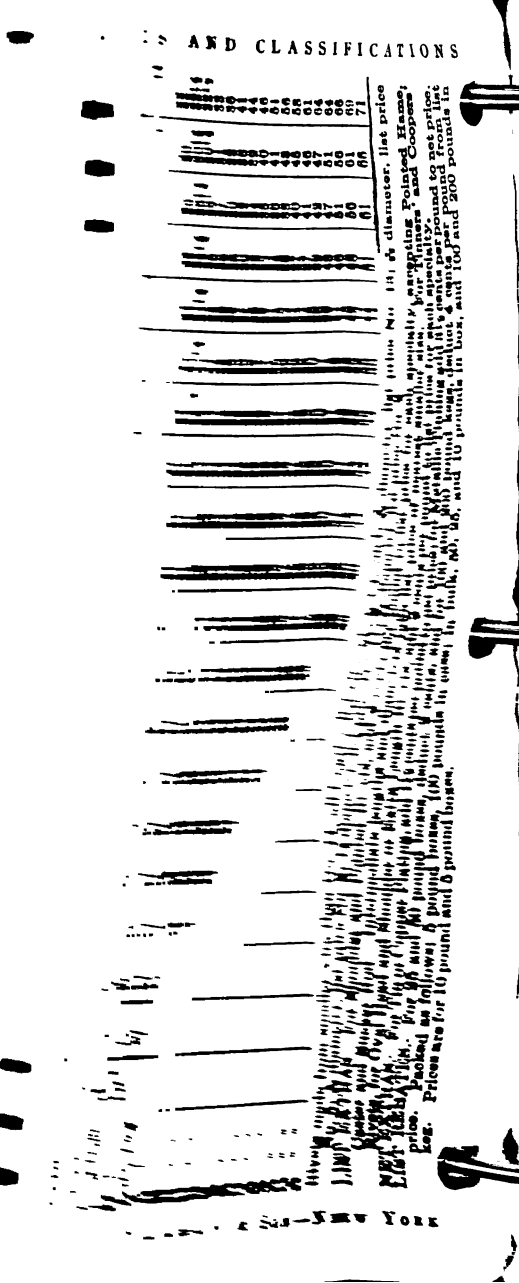
EXTRAS FOR WIDTHS AND LENGTHS GALVANIZED STEEL SHEETS

WIDTHS

No. 10 to 15, incl.	Over	32 in. to 40 in.	No extra		
	"	40 in. to 44 in.	Per 100 lbs. extra		$0.10
	"	44 in. to 48 in.	"	"	.20
No. 16 to 18, incl.	"	32 in. to 36 in.	No extra		
	"	36 in. to 44 in.	Per 100 lbs. extra		$0.10
	"	44 in. to 48 in.	"	"	.20
No. 19 to 21, incl.	"	32 in. to 36 in.	No extra		
	"	36 in. to 40 in.	Per 100 lbs. extra		$0.20
	"	40 in. to 44 in.	"	"	.30
	"	44 in. to 48 in.	"	"	.40
No. 22 to 24, incl.	"	32 in. to 36 in.	No extra		
	"	36 in. to 40 in.	Per 100 lbs. extra		$0.20
	"	40 in. to 44 in.	"	"	.40
	"	44 in. to 48 in.	"	"	.60
No. 25 and 26.	"	32 in. to 36 in.	No extra		
	"	36 in. to 40 in.	Per 100 lbs. extra		$0.30
	"	40 in. to 44 in.	"	"	.60
No. 27.	"	32 in. to 36 in.	No extra		
	"	36 in. to 40 in.	Per 100 lbs. extra		$0.50
	"	40 in. to 44 in.	"	"	.75
No. 28.	"	32 in. to 36 in.	"	"	.10
	"	36 in. to 40 in.	"	"	.50
No. 29 and 30.	"	32 in. to 36 in.	"	"	.10
No. 24 and heavier.	Under	24 in. to 12 in.	"	"	.10
	"	12 in. to 9 in.	"	"	.20
No. 25 and lighter.	"	24 in. to 12 in.	"	"	.15

LENGTHS

No. 10 to 30, incl.	Under	60 in. to 30 in.	Per 100 lbs. extra		$0.10
	"	30 in. to 24 in.	"	"	.15
	Over	132 in. to 144 in.	"	"	.10
Orders for less than 10 bundles or 1500 lbs. of one commodity			"	"	.10
Odd sizes when ordered in lots of less than 4000 lbs. of a size			"	"	.10



EXTRAS F
BL

No. 16 and heavier.
No. 16 and heavier.

No. 17 and 18.

No. 19 and lighter.

No. 19 to 21.

No. 22 to 24.

No. 25 and 26.

No. 27.

No. 28.

No. 29 and 30.

No. 16 and heavier.
No. 16 and heavier.

No. 17 and 18.

No. 19 and lighter.

Orders for less tha
one commodity.
Odd sizes when or
4000 lbs. of a si
Extras for Qual

CHICAGO—Jo

NEW YORK

TINNERS' RIVETS

PRICE LIST AND DIMENSIONS

Size	Black Rivets in Pkgs. of 1000	Black Rivets in Bulk per Pound*	Metallic Tinned Rivets Pkgs. of 1000	Tin Plated Rivets in Pkgs. of 1000	Length, Inches	Diameter B. W. G.
8 oz.	$0.22	$0.42	$0.31	$0.26	5/32	13¼
10 "	.24	.38	.35	.29	11/64	13
12 "	.26	.35	.39	.32	3/16	12¼
14 "	.28	.33	.43	.35	3/16	12
1 lb.	.29	.30	.47	.37	13/64	11¾
1¼ "	.32	.27	.54	.42	7/32	11
1½ "	.37	.26	.64	.49	15/64	10¼
1¾ "	.41	.25	.72	.55	¼	10
2 "	.44	.24	.79	.59	17/64	9¼
2½ "	.56	.24	1.00	.75	9/32	9
3 "	.62	.23	1.15	.85	5/16	8¼
3½ "	.72	.23	1.34	.99	21/64	8
4 "	.79	.22	1:49	1.09	11/32	7¼
5 "	1.00	.22	1.88	1.38	3/8	6¾
6 "	1.12	.21	2.17	1.57	25/64	6
7 "	1.31	.21	2.54	1.84	13/32	5¼
8 "	1.50	.21	2.90	2.10	7/16	4¾
9 "	1.68	.21	3.26	2.36	29/64	4¼
10 "	1.77	.20	3.52	2.52	15/32	4
12 "	2.06	.19½	4.16	2.96	½	3
14 "	2.40	.19½	4.85	3.45	33/64	2
16 "	2.77	.19½	5.57	3.97	17/32	1

*For Metallic Tinning, add 3½ cents per pound.

Copper and Tin Plating of Bulk Rivets, 1½ cents per pound net extra. Galvanising of Bulk Rivets, 2 cents extra.

LIST EXTRAS—For 25 and 50 pound boxes, deduct 2 cents per pound. For 100 and 200 pound kegs, deduct 4 cents per pound.

MILL EXTRAS ON RIVETS

	Per 100 Pounds
½ inch and 9/16 inch diameters	$0.50
5/8 inch and 11/16 inch diameters	.15
Rivets larger than 1¼ inch diameter	.25
Lengths 1 inch and shorter	.50
Lengths between 1 inch and 2 inches	.25
Lengths over 5 inches	.25
Flat Head Rivets	.25
All Standard Countersunk Head Rivets	.25
Rivets, Swell Necks	.25
Special Heads, other than our regular standards, minimum charge	.25
Cold, or Hot Made Solid Die Rivets, when specially specified	.25
Annealing Cold Made Rivets, ½ inch diameter and larger	.35
Small orders for miscellaneous sizes for less than two tons to parties not under contract	.10
Rivets packed in 100 pound packages	.10

No shipments made of less than 100 pounds of one size; broken kegs, 50 cents extra.

STANDARD WROUGHT STEAM, GAS AND WATER PIPE

FULL STANDARD WEIGHT — BLACK AND GALVANIZED

ALL WEIGHTS AND DIMENSIONS ARE NOMINAL

Size	Price per Foot	Diameters		Thickness	Weight per Foot		No. of Threads per Inch of Screw
		External	Internal		Plain Ends	Threads and Couplings	
⅛	$0.05½	.405	.269	.068	.244	.245	27
¼	.06	.540	.364	.088	.424	.425	18
⅜	.06	.675	.493	.091	.567	.568	18
½	.08½	.840	.622	.109	.850	.852	14
¾	.11½	1.050	.824	.113	1.130	1.134	14
1	.17	1.315	1.049	.133	1.678	1.684	11½
1¼	.23	1.660	1.380	.140	2.272	2.281	11½
1½	.27½	1.900	1.610	.145	2.717	2.731	11½
2	.37	2.375	2.067	.154	3.652	3.678	11½
2½	.58½	2.875	2.469	.203	5.793	5.819	8
3	.76½	3.500	3.068	.216	7.575	7.616	8
3½	.92	4.000	3.548	.226	9.109	9.202	8
4	1.09	4.500	4.026	.237	10.790	10.889	8
4½	1.27	5.000	4.506	.247	12.538	12.642	8
5	1.48	5.563	5.047	.258	14.617	14.810	8
6	1.92	6.625	6.065	.280	18.974	19.185	8
7	2.38	7.625	7.023	.301	23.544	23.769	8
8	2.50	8.625	8.071	.277	24.696	25.000	8
8	2.88	8.625	7.981	.322	28.554	28.809	8
9	3.45	9.625	8.941	.342	33.907	34.188	8
10	3.20	10.750	10.192	.279	31.201	32.000	8
10	3.50	10.750	10.136	.307	34.240	35.000	8
10	4.12	10.750	10.020	.365	40.483	41.132	8
11	4.63	11.750	11.000	.375	45.557	46.247	8
12	4.50	12.750	12.090	.330	43.773	45.000	8
12	5.07	12.750	12.000	.375	49.562	50.706	8
13	5.60	14.000	13.250	.375	54.568	55.824	8
14	6.10	15.000	14.250	.375	58.573	60.375	8
15	6.50	16.000	15.250	.375	62.579	64.500	8

On orders for 8, 10 and 12 inch pipe which do not specify the weight desired, we will furnish 8 inch 25 pound, 10 inch 35 pound, and 12 inch 45 pound pipe, respectively.

The permissible variation in weight is 5 per cent above and 5 per cent below.

Furnished with threads and couplings and in random lengths, unless otherwise ordered.

All weights given in pounds. All dimensions given in inches.

For cut lengths an extra charge will be made above random lengths.

For pipe smoothed on the inside, known as reamed and drifted, an extra charge will be made above standard pipe.

For galvanized or coated pipe, an extra charge will be made above black.

EXTRA STRONG WROUGHT PIPE

BLACK AND GALVANIZED

ALL WEIGHTS AND DIMENSIONS ARE NOMINAL

Size	Price per Foot	Diameters		Thickness	Weight per Foot Plain Ends
		External	Internal		
⅛	$0.12	.405	.215	.095	.314
¼	.07½	.540	.302	.119	.535
⅜	.07½	.675	.423	.126	.738
½	.11	.840	.546	.147	1.087
¾	.15	1.050	.742	.154	1.473
1	.22	1.315	.957	.179	2.171
1¼	.30	1.660	1.278	.191	2.996
1½	.36½	1.900	1.500	.200	3.631
2	.50½	2.375	1.939	.218	5.022
2½	.77	2.875	2.323	.276	7.661
3	1.03	3.500	2.900	.300	10.252
3½	1.25	4.000	3.364	.318	12.505
4	1.50	4.500	3.826	.337	14.983
4½	1.80	5.000	4.290	.355	17.611
5	2.08	5.563	4.813	.375	20.778
6	2.86	6.625	5.761	.432	28.573
7	3.81	7.625	6.625	.500	38.048
8	4.34	8.625	7.625	.500	43.388
9	4.90	9.625	8.625	.500	48.728
10	5.48	10.750	9.750	.500	54.735
11	6.10	11.750	10.750	.500	60.075
12	6.55	12.750	11.750	.500	65.415

The permissible variation in weight is 5 per cent above and 5 per cent below.

DOUBLE EXTRA STRONG WROUGHT PIPE

ALL WEIGHTS AND DIMENSIONS ARE NOMINAL

Size	Price per Foot	Diameters		Thickness	Weight per Foot Plain Ends
		External	Internal		
¼	$0.32	.840	.252	.294	1.714
¾	.35	1.050	.434	.308	2.440
1	.37	1.315	.599	.358	3.659
1¼	.52½	1.660	.896	.382	5.214
1½	.65	1.900	1.100	.400	6.408
2	.91	2.375	1.503	.436	9.029
2½	1.37	2.875	1.771	.552	13.695
3	1.86	3.500	2.300	.600	18.583
3½	2.30	4.000	2.728	.636	22.850
4	2.76	4.500	3.152	.674	27.541
4½	3.26	5.000	3.580	.710	32.530
5	3.86	5.563	4.063	.750	38.552
6	5.32	6.625	4.897	.864	53.160
7	6.35	7.625	5.875	.875	63.079
8	7.25	8.625	6.875	.875	72.424

The permissible variation in weight is 10 per cent above and 10 per cent below.

All weights given in pounds. All dimensions given in inches.

EXTRA HEAVY OR HYDRAULIC TUBES

Away from Standard

SPECIAL PRICES GIVEN ON APPLICATION

LIST PRICE PER FOOT OF

ROUND COLD DRAWN SEAMLESS STEEL TUBING FOR MECHANICAL PURPOSES

Outside Diameter in Inches	Thickness B. W. G. and Fractions and Equivalents in Decimal of an Inch																		
	20	18	16	14	13	12	11	10	5/32	3/16	7/32	1/4	9/32	5/16	1/2	5/8	3/4	7/8	1
	.035	.049	.065	.083	.095	.109	.120	.134	.156	.188	.219	.250	.313	.375	.500	.625	.750	.875	1.00
1/2	.09	.12	.15	.19	.22	.23	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5/8	.11	.15	.20	.24	.27	.30	.33	.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3/4	.14	.19	.24	.30	.33	.38	.41	.44	.50	.57	.....	.....	.....	.....	.....	.....	.....	.....	.....
7/8	.16	.22	.28	.35	.40	.45	.49	.53	.60	.69	.77	.....	.....	.....	.....	.....	.....	.....	.....
1	.18	.25	.33	.42	.46	.52	.57	.62	.71	.82	.91	1.00	.....	.....	.....	.....	.....	.....	.....
1 1/8	.21	.28	.37	.46	.52	.59	.65	.71	.81	.94	1.06	1.17	.....	.....	.....	.....	.....	.....	.....
1 1/4	.23	.32	.41	.52	.59	.67	.73	.80	.91	1.07	1.21	1.34	1.57	1.75	.....	.....	.....	.....	.....
1 3/8	.25	.35	.46	.57	.65	.74	.81	.89	1.02	1.19	1.35	1.50	1.77	2.00	.....	.....	.....	.....	.....
1 1/2	.28	.38	.50	.63	.71	.81	.89	.98	1.12	1.32	1.50	1.67	1.98	2.25	2.67	.....	.....	.....	.....
1 3/4	.....	.....	.58	.74	.84	.96	1.05	1.16	1.33	1.57	1.79	2.00	2.40	2.75	3.34	.....	.....	.....	.....
2	.....	.....	.67	.85	.97	1.10	1.21	1.34	1.54	1.82	2.08	2.34	2.82	3.25	4.00	4.59	.....	.....	.....
2 1/4	.....	.....	.76	.96	1.10	1.25	1.37	1.52	1.75	2.07	2.37	2.67	3.23	3.75	4.67	5.42	.....	.....	.....
2 1/2	.....	.....	.85	1.07	1.22	1.39	1.53	1.70	1.96	2.32	2.66	3.00	3.65	4.25	5.34	6.25	.....	.....	.....
2 3/4	.....	.....	.93	1.18	1.35	1.54	1.69	1.87	2.16	2.57	2.96	3.34	4.07	4.76	6.00	7.09	.....	.....	.....
3	.....	.....	.....	.....	1.48	1.69	1.85	2.05	2.37	2.82	3.25	3.67	4.48	5.25	6.67	7.92	9.00	9.92	10.67
3 1/4	.....	.....	.....	.....	1.60	1.83	2.01	2.23	2.58	3.07	3.54	4.00	4.90	5.75	7.34	8.75	10.00	11.09	12.01
3 1/2	.....	.....	.....	.....	1.73	1.97	2.17	2.41	2.79	3.32	3.83	4.34	5.32	6.25	8.00	9.59	11.00	12.26	13.34
3 3/4	.....	.....	.....	.....	.....	.....	2.33	2.59	3.00	3.57	4.12	4.67	5.73	6.75	8.67	10.42	12.01	13.42	14.67
4	.....	.....	.....	.....	.....	.....	2.49	2.77	3.21	3.82	4.41	5.00	6.15	7.25	9.34	11.25	13.00	14.59	16.01
4 1/4	.....	.....	.....	.....	.....	.....	.....	2.95	3.41	4.07	4.71	5.34	6.57	7.75	10.00	12.09	14.01	15.76	17.34
4 1/2	.....	.....	.....	.....	.....	.....	.....	3.13	3.62	4.32	5.00	5.67	6.98	8.25	10.67	12.92	15.01	16.92	18.67
4 3/4	.....	.....	.....	.....	.....	.....	.....	3.31	3.83	4.57	5.29	6.00	7.40	8.76	11.34	13.76	16.01	18.09	20.01
5	.....	.....	.....	.....	.....	.....	.....	3.48	4.04	4.82	5.58	6.34	7.82	9.26	12.00	14.59	17.01	19.26	21.34
5 1/2	.....	.....	.....	.....	.....	.....	.....	3.84	4.46	5.32	6.16	7.00	8.65	10.26	13.34	16.26	19.01	21.59	24.01

CUTTING CHARGES PER 100 CUTS

Gauge	Deci	Outside Diameter in Inches																								
		½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4¼	4½	4¾	5	5½
20	.035	.75	.76	.77	.78	.79	.80	.81	.82	.84	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
18	.049	.76	.78	.79	.81	.83	.84	.86	.88	.89	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
16	.065	.77	.80	.82	.84	.87	.88	.91	.93	.95	.99	1.04	1.08	1.13	1.17	....	....	....	....	....	....	....	....	....	....	....
14	.083	.79	.82	.85	.87	.91	.93	.96	.98	1.01	1.07	1.12	1.18	1.24	1.29	....	....	....	....	....	....	....	....	....	....	....
13	.095	.81	.84	.87	.90	.93	.96	1.00	1.03	1.06	1.12	1.19	1.25	1.31	1.38	1.44	1.50	1.57	....	....	....	....	....	....	....	....
12	.109	.82	.85	.89	.93	.96	1.00	1.04	1.07	1.11	1.18	1.25	1.33	1.40	1.47	1.55	1.62	1.69	....	....	....	....	....	....	....	....
11	.120	.83	.87	.90	.95	.99	1.03	1.07	1.11	1.15	1.23	1.31	1.39	1.47	1.55	1.63	1.71	1.79	1.87	1.95	....	....	....	....	....	....
10	.134	....	.88	.92	.97	1.01	1.06	1.10	1.15	1.19	1.28	1.37	1.46	1.55	1.64	1.73	1.82	1.91	2.00	2.09	2.18	2.27	2.36	2.44	2.62	....
9/32	.156	....	....	.95	1.00	1.06	1.10	1.16	1.21	1.26	1.37	1.47	1.58	1.68	1.78	1.89	1.99	2.10	2.20	2.31	2.41	2.51	2.62	2.72	2.93	....
7/32	.188	....	....	.98	1.04	1.11	1.17	1.24	1.30	1.36	1.49	1.61	1.74	1.86	1.99	2.11	2.24	2.36	2.49	2.61	2.74	2.86	2.99	3.11	3.36	....
13/64	.218	....	....	....	1.08	1.15	1.23	1.31	1.38	1.45	1.60	1.74	1.89	2.03	2.18	2.33	2.47	2.62	2.76	2.91	3.06	3.20	3.35	3.49	3.78	....
¼	.250	....	....	....	....	1.20	1.29	1.37	1.45	1.54	1.70	1.87	2.04	2.20	2.37	2.54	2.70	2.87	3.04	3.20	3.37	3.54	3.70	3.87	4.20	....
5/16	.312	....	....	....	....	....	....	1.49	1.58	1.69	1.90	2.11	2.32	2.53	2.73	2.94	3.15	3.36	3.57	3.78	3.99	4.19	4.40	4.61	5.03	....
11/32	.375	....	....	....	....	....	....	1.58	1.70	1.83	2.08	2.33	2.58	2.83	3.08	3.33	3.58	3.83	4.08	4.33	4.58	4.83	5.08	5.33	5.83	....
½	.500	....	....	....	....	....	....	....	....	2.04	2.38	2.70	3.04	3.37	3.70	4.04	4.37	4.70	5.04	5.37	5.70	6.04	6.37	6.70	7.37	....
⅝	.625	....	....	....	....	....	....	....	....	....	....	3.00	3.41	3.83	4.25	4.66	5.08	5.49	5.91	6.33	6.75	7.16	7.58	8.00	8.83	....
¾	.750	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5.20	5.70	6.20	6.71	7.20	7.71	8.21	8.71	9.21	10.21	....
⅞	.875	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5.66	6.25	6.83	7.41	8.00	8.58	9.16	9.75	10.33	11.50	....
1	1.000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6.04	6.71	7.37	8.04	8.71	9.37	10.04	10.71	11.37	12.72	....

The above extras apply on shipments from mill only. Cutting to length from stock takes a net advance of 10 per cent over the price of material.

TOOL STEEL CLASSIFICATION

ALL DIMENSIONS INCLUSIVE

ROUNDS, SQUARES AND OCTAGONS

5/8 to 2 inches take base price.

Size in Inches	Price per Pound Extra	Size in Inches	Price per Pound Extra
2 1/8 to 3	$0.01	3/16 to 1/2	$0.00 1/2
3 1/8 to 4	.01 1/2	7/16 to 3/8	.01
4 1/8 to 5	.02	5/16 and 11/32	.02
5 1/8 to 6	.02 1/2	1/4 and 9/32	.03
6 1/8 to 7	.03	3/16	.05
7 1/8 to 8	.03 1/2	1/8	.18

FLATS

5/8 to 2 inches thick × 9/16 to 2 inches wide take base price.

Size in Inches	Price per Pound Extra	Size in Inches	Price per Pound Extra
1/8 × 3/16	$0.20	5/16 × 3/8 to 5/8	$.01 1/2
1/8 × 1/4	.15	5/16 × 11/16 to 8	.01
1/8 × 5/16	.08	3/8 × 7/16 to 8	.01
1/8 × 3/8	.04	7/16 × 1/2 to 8	.01
1/8 × 7/16 to 1/2	.03	1/2 × 9/16 to 8	.01
1/8 × 9/16 to 7	.02	9/16 × 2 1/2 to 8	.01
1/8 × 7 1/8 to 8	.03	5/8 to 2 × 2 1/8 to 7	.01
3/16 × 1/4	.05	5/8 to 1 3/4 × 7 1/8 to 8	.01
3/16 × 5/16	.04	1 7/8 to 2 × 7 1/8 to 8	.01 1/2
3/16 × 3/8	.03	2 1/8 to 3 × 2 1/8 to 5	.01
3/16 × 7/16 to 5/8	.02	2 1/2 to 3 × 5 1/8 to 8	.01 1/2
3/16 × 11/16 to 2	.01 1/2	3 1/8 to 4 × 3 1/8 to 6	.01 1/2
3/16 × 2 1/8 to 7	.01 1/2	3 1/8 to 4 × 6 1/8 to 8	.02
3/16 × 7 1/8 to 8	.02	4 1/8 to 5 × 4 1/8 to 7	.02
1/4 × 5/16 to 3/8	.02	4 1/8 to 5 × 7 1/8 to 8	.02 1/2
1/4 × 7/16 to 5/8	.01 1/2	5 1/8 to 6 × 5 1/8 to 8	.02 1/2
1/4 × 11/16 to 2	.01 1/2	6 1/8 to 7 × 6 1/8 to 7	.03
1/4 × 2 1/8 to 7	.01	6 1/8 to 8 × 7 1/8 to 8	.03 1/2
1/4 × 7 1/8 to 8	.02		

Intermediate sizes take the next higher price.

CUTTING TO SPECIFIED SINGLE AND MULTIPLE LENGTHS

Length in Inches	Price per Pound Extra	Length in Inches	Price per Pound Extra
24 or over	$0.00 1/2	12 to 18	$0.01 1/2
18 to 24	.01	6 to 12	.02

Less than 6 inches, contract price.
1 cent per pound extra for annealing.

MANUFACTURERS' STANDARD SPECIFICATIONS

REVISED 1912

STRUCTURAL STEEL

GRADES

1. These specifications cover three classes of structural steel, namely:

Class A steel, to be used for railway bridges and ships.

Class B steel, to be used for buildings, highway bridges, train sheds and similar structures.

Class C steel, to be used for structural rivets.

I. MANUFACTURE

PROCESS

2. Steel for Classes A and C shall be made by the open-hearth process. Steel for Class B may be made either by the open-hearth or by the Bessemer process.

II. CHEMICAL PROPERTIES AND TESTS

CHEMICAL COMPOSITION

3. The steel shall conform to the following requirements as to chemical composition:

Elements Considered	Class A Steel	Class B Steel	Class C Steel
Phosphorus, maximum, per cent:			
Basic open-hearth	0.04	0.06	0.04
Acid, open-hearth	0.06	0.08	0.04
Bessemer	.....	0.10	.....
Sulphur, maximum, per cent	0.05		0.045

LADLE ANALYSES

4. To determine whether the material conforms to the requirements specified in Section 3, an analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt. A copy of this analysis shall be given to the purchaser or his representative, if requested.

CHECK ANALYSES

5. A check analysis of Class A and Class C steel may be made by the purchaser from finished material representing each melt, in which case an excess of 25 per cent above the requirements specified in Section 3 shall be allowed.

III. PHYSICAL PROPERTIES AND TESTS

TENSION TESTS

6. The steel shall conform to the following requirements as to tensile properties:

Properties Considered	Class A Steel	Class B Steel	Class C Steel
Tensile strength, pound per square inch	55,000–65,000	55,000–65,000 *	46,000–56,000
Yield point, minimum, pound per square inch	0.5 tens. str.	0.5 tens. str.	0.5 tens. str.
Elongation in 8 inches, minimum, per cent	1,400,000 † / tens. str.	1,400,000 † / tens. str.	1,400,000 / tens. str.
Elongation in 2 in., min., per cent (Fig. 2)	22	22	

*See Section 8. †See Section 9.

YIELD POINT

7. The yield point shall be determined by the drop of the beam of the testing machine.

MODIFICATION IN TENSILE STRENGTH

8. Class B steel may have tensile strength up to 70,000 pounds maximum, provided the elongation is not less than the percentage required for 65,000 pounds tensile strength.

MODIFICATIONS IN ELONGATION

9. (a) For material over ¾ inch in thickness, a deduction of 1 from the percentage of elongation in 8 inches specified for Classes A and B in Section 6 shall be made for each increase of ⅛ inch in thickness above ¾ inch, to a minimum of 18 per cent.

(b) For material under $\frac{5}{16}$ inch in thickness, a deduction of 2.5 from the percentage of elongation in 8 inches specified for Classes A and B in Section 6 shall be made for each decrease of $\frac{1}{16}$ inch in thickness below $\frac{5}{16}$ inch.

CHARACTER OF FRACTURE

10. All broken tension test specimens shall show a silky fracture.

BEND TESTS

11. (a) The test specimen for plates, shapes and bars shall bend cold through 180 degrees without fracture on the outside of the bent portion, as follows: For material ¾ inch and under in thickness, flat on itself; for material over ¾ inch up to 1¼ inches in thickness, around a pin the diameter of which is equal to 1½ times the thickness of the specimen; and for material over 1¼ inches in thickness, around a pin the diameter of which is equal to twice the thickness of the specimen.

(b) The test specimen for pins and rollers shall bend cold through 180 degrees around a 1 inch pin without fracture on the outside of the bent portion.

(c) A rivet rod shall bend cold through 180 degrees flat on itself without fracture on the outside of the bent portion.

(d) Bend tests may be made by pressure or by blows.

TEST SPECIMENS

12. (a) Tension and bend test specimens shall be taken from the finished rolled or forged product, and shall not be annealed or otherwise treated, except as specified in Section 13.

(b) Tension and bend test specimens for plates, shapes and bars, except as specified in paragraph (c), shall be of the full thickness of material as rolled, and with both edges milled to the form and dimensions shown in Fig. 1, or may have both edges parallel.

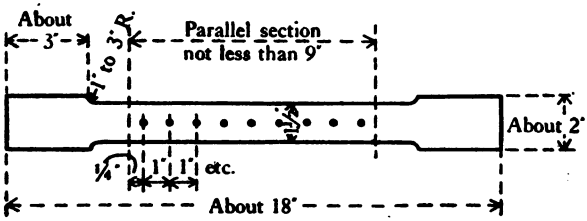


FIG. 1

(c) Tension and bend test specimens for plates and bars (except eye-bar flats) over 1½ inches in thickness or diameter may be turned or planed to a diameter or thickness of at least ¾ inch for a length of at least 9 inches.

(d) Tension and bend test specimens for pins and rollers shall be taken parallel to the axis, 1 inch from the surface of the bar. Tension test specimens shall be of the form and dimensions shown in Fig. 2. Bend test specimens shall be 1 inch by ½ inch in section.

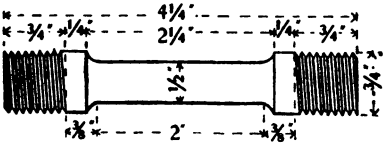


FIG. 2

(e) Rivet bars shall be tested in full-size section as rolled.

ANNEALED SPECIMENS

13. Test specimens for material which is to be annealed or otherwise treated before use, shall be cut from properly annealed or similarly treated short lengths of the full section of the piece.

NUMBER OF TESTS

14. (a) At least one tension test and one bend test shall be made from each melt. If material from one melt differs $\frac{3}{8}$ inch or more in thickness, tests shall be made from both the thickest and the thinnest material rolled.

(b) If any test specimen develops flaws, or in an 8 inch tension test specimen breaks outside the middle third of the gauge length, or if a 2 inch tension test specimen breaks outside the gauge length, it may be discarded and another specimen substituted therefor.

(c) Material intended for fillers or ornamental purposes will not be subject to test.

IV. PERMISSIBLE VARIATIONS IN WEIGHT AND GAUGE

PERMISSIBLE VARIATIONS

15 (a) The sectional area or weight of each structural shape or rolled-edge plate shall not vary more than 2.5 per cent from theoretical or specified amounts.

(b) The thickness or weight of each sheared plate shall conform to the schedule of permissible variations, Manufacturers' Standard practice, appended to these specifications.

(c) The weights of angles, tees, zees and channels of bar sizes, and the dimensions of rounds, squares, hexagons and flats, shall conform to the Manufacturers' Standard practice governing the allowable variations in size and weight of hot-rolled bars, appended to these specifications.

V. FINISH

FINISH

16. The finished material shall be free from injurious defects, and shall have a workmanlike finish.

VI. MARKING

MARKING

17. The name of the manufacturer and the melt number shall be legibly marked, stamped or rolled upon all finished material, except that each pin and roller shall be stamped on the end. Rivet and lattice steel and other small pieces may be shipped in securely fastened bundles, with the above marks legibly stamped on attached metal tags. Test specimens shall have their melt numbers plainly marked or stamped.

VII. INSPECTION AND REJECTION

INSPECTION

18. The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

REJECTION

19. Material which, subsequent to the above tests at the mills and its acceptance there, develops weak spots, brittleness, cracks or other imperfections, or is found to have injurious defects, may be rejected at the shop, and shall then be replaced by the manufacturer at his own cost.

BOILER STEEL

GRADES

1. There shall be three grades of steel for boilers, namely: flange, fire box, and boiler rivet.

I. MANUFACTURE

PROCESS

2. The steel shall be made by the open-hearth process.

II. CHEMICAL PROPERTIES AND TESTS

CHEMICAL COMPOSITION

3. The steel shall conform to the following requirements as to chemical composition:

Elements Considered	Flange Steel	Fire Box Steel	Boiler Rivet Steel
Manganese, per cent	0.30 to 0.6	0.30 to 0.50	0.30 to 0.50
Phosphorus, max., per cent:			
Basic	0.04	0.035	0.04
Acid	0.05	0.04	0.04
Sulphur, max., per cent	0.05	0.04	0.045

LADLE ANALYSES

4. To determine whether the material conforms to the requirements specified in Section 3, an analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt. A copy of this analysis shall be given to the purchaser or his representative.

CHECK ANALYSES

5. A check analysis may be made by the purchaser from a broken tension test specimen representing each plate as rolled, and this analysis shall conform to the requirements specified in Section 3.

III. PHYSICAL PROPERTIES AND TESTS

TENSION TESTS

6. The steel shall conform to the following requirements as to tensile properties:

Properties Considered	Flange Steel	Fire Box Steel	Boiler Rivet Steel
Tensile strength, pound per square inch	55,000–65,000	52,000–62,000	45,000–55,000
Yield point, minimum pound per square inch	0.5 tens str.	0.5 tens str.	0.5 tens. str.
Elongation in 8 inches, minimum, per cent	1,450,000 * / tens. str.	1,450,000 * / tens. str.	1,450,000 / tens. str.

*See Section 8.

YIELD POINT

7. The yield point shall be determined by the drop of the beam of the testing machine.

MODIFICATIONS IN ELONGATION

8. (a) For plates over ¾ inch in thickness, a deduction of 0.5 from the specified percentage of elongation will be allowed for each increase of ⅛ inch in thickness above ¾ inch, to a minimum of 20 per cent.

(b) For plates under $\frac{5}{16}$ inch in thickness, a deduction of 2.5 from the percentage of elongation specified in Section 6 shall be made for each decrease of $\frac{1}{16}$ inch in thickness below $\frac{5}{16}$ inch.

BEND TESTS

9. (a) Cold-bend tests shall be made on the material as rolled.

(b) Quench-bend test specimens, before bending, shall be heated to a light cherry red as seen in the dark (about 1200 deg. F.), and quenched in water the temperature of which is about 80 deg. F.

(c) Specimens for cold-bend and quench-bend tests of flange and fire box steel shall bend through 180 degrees without fracture on the outside of the bent portion, as follows: For material ¾ inch and under in thickness, flat on themselves; for material over ¾ inch up to 1¼ inch in thickness, around a pin the diameter of which is equal to the thickness of the specimen; and for material over 1¼ inches in thickness, around a pin the diameter of which is equal to 1½ times the thickness of the specimen.

(d) Specimens for cold-bend and quench-bend tests of boiler rivet steel shall bend cold through 180 degrees flat on themselves without fracture on the outside of the bent portion.

(e) Bend tests may be made by pressure or by blows.

TEST SPECIMENS

10. (a) Tension and bend test specimens for plates shall be taken from the finished product, and shall be of the full thickness of material as rolled. Tension test specimens shall be of the form and dimensions shown in Fig. 1. Bend test specimens shall be 1½ inches to 2½ inches wide, and shall have the sheared edges milled or planed.

(b) The tension and bend test specimens for rivet bars shall be of the full size section of material as rolled.

NUMBER OF TESTS

11. (a) One tension, one cold-bend, and one quench-bend test shall be made from each plate as rolled.

(b) Two tension, two cold-bend, and two quench-bend tests shall be made for each melt of rivet steel.

(c) If any test specimen develops flaws, or if a tension test specimen breaks outside the middle third of the gauge length, it may be discarded and another specimen substituted therefor.

IV. PERMISSIBLE VARIATIONS IN WEIGHT AND GAUGE

PERMISSIBLE VARIATIONS

12. (a) The thickness or weight of each sheared plate shall conform to the schedule of permissible variations, Manufacturers' Standard practice, appended to these specifications.

(b) The dimensions of rivet bars shall conform to the Manufacturers' Standard practice governing allowable variations in the size of hot-rolled bars, appended to these specifications.

V. FINISH

FINISH

13. The finished material shall be free from injurious defects, and shall have a workmanlike finish.

VI. MARKING

MARKING

14. The melt or slab number, name of the maunfacturer, grade, and the minimum tensile strength for its grade as specified in Section 6 shall be legibly stamped on each plate. The melt or slab number shall be legibly stamped on each test specimen representing that melt or slab.

VII. INSPECTION AND REJECTION

INSPECTION

15. The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

REJECTION

16. Material which, subsequent to the above tests at the mills and its acceptance there, develops weak spots, brittleness, cracks or other imperfections, or is found to have injurious defects, may be rejected at the shop, and shall then be replaced by the manufacturer at his own cost.

SPECIFICATIONS FOR FIRE BOX STEEL PLATES

AS ADVOCATED BY
HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO.

Shell plates shall be of Open Hearth Fire Box Steel, having a tensile strength of not less than 55,000 pounds, nor more than 62,000 pounds per square inch of section, and an elastic limit of not less than half the tensile strength, with not less than 56 per cent of ductility as indicated by contraction of area at point of fracture under test, and by an elongation of 25 per cent in a length of 8 inches.

Each shell plate is to bear a coupon which shall be sheared off, finished up and tested by, or for, the maker of the boiler, at his expense. Each coupon is to fulfill the foregoing requirements as to strength and ductility, and stand bending down double when cold, when red hot, and after being heated red hot and quenched in cold water, without signs of fracture. There is not to be more than .035 per cent of sulphur, nor more than .035 per cent of phosphorus in the chemical composition of the plates and heads. All plates failing to pass these tests will be rejected. All tests and inspections of material may be made at the place of manufacture prior to shipment. Certified copies of report of said tests must be sent to the Hartford Steam Boiler Inspection and Insurance Company, and be approved, before any work is done on the boiler.

Heads shall be of best Open Hearth Flange Steel in accordance with Manufacturers' Standard Specifications.

All plates both of shell and heads are to be plainly stamped with name of maker, brand and tensile strength; brands so located that they may be seen on each plate after the boiler is finished.

ADOPTED 1896

MANUFACTURERS' STANDARD PRACTICE

PERMISSIBLE VARIATIONS IN SHEARED PLATES

SCHEDULE OF PERMISSIBLE VARIATIONS

The thickness or weight of each sheared plate shall not vary more than the permissible variations given below:

(a) WHEN ORDERED TO WEIGHT:

For plates 12½ pounds per square foot or over:

Under 100 inches in width, 2.5 per cent above or below the specified weight.

100 inches in width and over, 5 per cent above or below the specified weight.

For plates under 12½ pounds per square foot:

Under 75 inches in width, 2.5 per cent above or below the specified weight.

75 to 100 inches in width, 5 per cent above or 3 per cent below the specified weight.

100 inches in width and over, 10 per cent above or 3 per cent below the specified weight.

(b) WHEN ORDERED TO GAUGE.—The thickness of each plate shall not vary more than 0.01 inch under that ordered.

An excess over the nominal weight corresponding to the dimensions on the order shall be allowed for each plate, if not more than that shown in the following table; one cubic inch of rolled steel being assumed to weigh 0.2833 pound:

TABLE OF ALLOWANCES FOR OVERWEIGHT FOR SHEARED PLATES WHEN ORDERED TO GAUGE

Thickness Ordered, Inches	Nominal Weight, Pound per Square Foot	Allowable Excess (expressed as percentage of Nominal Weight) For Width of Plate as Follows:						
		Under 50 In.	50 In. to 70 In.	70 In. and Over	Under 75 In.	75 In. to 100 In.	100 In. to 115 In.	115 In. and Over
1/8 to 5/32	5.10 to 6.37	10	15	20	....	.....	....	.....
5/32 to 3/16	6.37 to 7.65	8.5	12.5	17	....	.....	....	.....
3/16 to 1/4	7.65 to 10.20	7	10	15	....	.....	....	.....
1/4	10.20	.....	.....	.....	10	14	18	.....
5/16	12.75	.....	.....	.....	8	12	16	.....
5/8	15.30	.....	.....	.....	7	10	13	17
7/16	17.85	.....	.....	.....	6	8	10	13
1/2	20.40	.....	.....	.....	5	7	9	12
9/16	22.95	.....	.....	.....	4.5	6.5	8.5	11
5/8	25.50	.....	.....	.....	4	6	8	10
Over 5/8	.....	.....	.....	.....	3.5	5	6.5	9

MANUFACTURERS' STANDARD SPECIFICATIONS

GOVERNING THE ALLOWABLE VARIATIONS IN SIZE AND WEIGHT OF

HOT-ROLLED BARS

AS ADOPTED BY THE ASSOCIATION OF AMERICAN STEEL MANUFACTURERS, 1910

BAR SIZES OF ANGLES, TEES, ZEES AND CHANNELS

For bar sizes of angles, tees, zees and channels the following average variations in weight will be permitted for sections of the various dimensions and thicknesses stated, viz.:

Dimensions	Thickness	Variation in Weight
Any dimension over 1½″	Over $\frac{3}{16}$″	4% over and under.
All dimensions 1½″ and less	Over $\frac{3}{16}$″	5% over and under.
Any dimension over 1½″	$\frac{3}{16}$″ and less	6% over and under.
All dimensions 1½″ and less	$\frac{3}{16}$″ and less	7% over and under.

NOTE.—A channel is in "bar" size when its greatest dimension is less than 3 inches. An angle, tee or zee is in "bar" size when its greatest dimension is less than 3 inches; or when it is 3 inches or more and at the same time the thickness is less than ¼ inch.

ROUNDS, SQUARES, HEXAGONS

Dimensions	Variations in Size	
	Under	Over
Up to and including ½″	.007″	.007″
Over ½″, up to and including 1″	.010″	.010″
Over 1″, up to and including 2″	$\frac{1}{64}$″	$\frac{1}{32}$″
Over 2″, up to and including 3″	$\frac{1}{32}$″	$\frac{3}{64}$″
Over 3″, up to and including 5″	$\frac{1}{32}$″	$\frac{3}{32}$″
Over 5″, up to and including 8″	$\frac{1}{16}$″	$\frac{1}{8}$″

FLATS

Width of Flats	Variation in Width		Variation in Thickness, Under and Over			
			Thickness of Flats			
	Under	Over	$\frac{1}{16}$″ and under	Over $\frac{1}{16}$″ up to ½″	Over ½″ up to 1″	Over 1″ up to 2″
Up to and including 1″	$\frac{1}{64}$″	$\frac{1}{32}$″	.006″	.008″	.010″	.....
Over 1″, up to and including 2″	$\frac{1}{32}$″	$\frac{3}{64}$″	.008″	.012″	.015″	$\frac{1}{32}$″
Over 2″, up to and including 4″	$\frac{3}{64}$″	$\frac{1}{16}$″	.010″	.015″	.020″	$\frac{1}{32}$″
Over 4″, up to and including 6″	$\frac{1}{16}$″	$\frac{3}{32}$″	.010″	.015″	.020″	$\frac{1}{32}$″

STANDARD SPECIFICATIONS FOR CONCRETE REINFORCEMENT BARS ROLLED FROM BILLETS

ADOPTED 1910 REVISED 1912

MANUFACTURE

1. Steel may be made by either the open-hearth or Bessemer process. Bars shall be rolled from standard new billets.

CHEMICAL AND PHYSICAL PROPERTIES

2. The chemical and physical properties shall conform to the following limits:

Properties Considered	Structural Steel Grade		Hard Grade		Cold-Twisted Bars
	Plain Bars	Deformed Bars	Plain Bars	Deformed Bars	
Phosphorus, maximum:					
Bessemer	.10	.10	.10	.10	.10
Open-hearth	.06	.06	.06	.06	.06
Ultimate Tensile strength, pounds per square inch	55/70,000	55/70,000	80,000 min.	80,000 min.	Recorded only.
Yield point, minimum, pounds per square inch	33,000	33,000	50,000	50,000	55,000
Elongation, per cent in 8 inches, minimum	1,400,000 / T. S.	1,250,000 / T. S.	1,200,000 / T. S.	1,000,000 / T. S.	5%
Cold Bend without fracture:					
Bars under ¾ inch in diameter or thickness	180°d.=1t.	180°d.=1t.	180°d.=3t.	180°d.=4t.	180°d.=2t.
Bars ¾ inch in diameter or thickness and over	180°d.=1t.	180°d.=2t.	90°d.=3t.	90°d.=4t.	180°d.=3t.

The hard grade will be used only when specified.

CHEMICAL DETERMINATIONS

3. In order to determine if the material conforms to the chemical limitations prescribed in paragraph 2 herein, analysis shall be made by the manufacturer from a test ingot taken at the time of the pouring of each melt or blow of steel, and a correct copy of such analysis shall be furnished to the engineer or his inspector.

YIELD POINT

4. For the purposes of these specifications, the yield point shall be determined by careful observation of the drop of the beam of the testing machine, or by other equally accurate method.

FORM OF SPECIMENS

5. (a) Tensile and bending test specimens may be cut from the bars as rolled, but tensile and bending test specimens of deformed bars may be planed or turned for a length of at least 9 inches if deemed necessary by the manufacturer in order to obtain uniform cross-section.

(b) Tensile and bending test specimens of cold-twisted bars shall be cut from the bars after twisting, and shall be tested in full size without further treatment, unless otherwise specified as in (c), in which case the conditions therein stipulated shall govern.

(c) If it is desired that the testing and acceptance for cold-twisted bars be made upon the hot-rolled bars before being twisted, the hot-rolled bars shall meet the requirements of the structural steel grade for plain bars shown in this specification.

NUMBER OF TESTS

6. At least one tensile and one bending test shall be made from each melt of open-hearth steel rolled, and from each blow or lot of ten tons of Bessemer steel rolled. In case bars differing $\frac{3}{8}$ inch and more in diameter or thickness are rolled from one melt or blow, a test shall be made from the thickest and thinnest material rolled. Should either of these test specimens develop flaws, or should the tensile test specimen break outside of the middle third of its gauged length, it may be discarded and another test specimen substituted therefor. In case a tensile test specimen does not meet the specifications, an additional test may be made.

(d) The bending test may be made by pressure or by light blows.

MODIFICATIONS IN ELONGATION FOR THIN AND THICK MATERIAL

7. For bars less than $\frac{7}{16}$ inch and more than $\frac{3}{4}$ inch nominal diameter or thickness, the following modifications shall be made in the requirements for elongation:

(e) For each increase of $\frac{1}{8}$ inch in diameter or thickness above $\frac{3}{4}$ inch, a deduction of 1 shall be made from the specified percentage of elongation.

(f) For each decrease of $\frac{1}{16}$ inch in diameter or thickness below $\frac{7}{16}$ inch, a deduction of 1 shall be made from the specified percentage of elongation.

(g) The above modifications in elongation shall not apply to cold-twisted bars.

NUMBER OF TWISTS

8. Cold-twisted bars shall be twisted cold with one complete twist in a length equal to not more than 12 times the thickness of the bar.

FINISH

9. Material must be free from injurious seams, flaws or cracks, and have a workmanlike finish.

VARIATION IN WEIGHT

10. Bars for reinforcement are subject to rejection if the actual weight of any lot varies more than 5 per cent over or under the theoretical weight of that lot.

9—WEIGHTS

IN connection with the use of weight tables on the pages of this section, we offer the following notes with particular reference to weights of warehouse material:

Bars and Bar Sizes of Angles, Tees, Zees and Channels are sold on the basis of actual scale weight. In checking weights with theoretical or table weights, there should be considered both the allowable mill variation for weight and the variations for shearing, as per tables in Section 8.

Structural Beams, Angles, Channels and Tees are sold on the basis of table or theoretical weights, a custom universally accepted by the trade and by the manufacturers, and made necessary by the extreme lengths in which this material is usually rolled. Sections from newly cut rolls may run slightly under table weights and if rolls are worn, will run slightly over table weights.

Plates are sold on a basis of actual scale weights. In rolling plates, rolls spring more or less and the center of the plate is usually heavier than the edges, the variation being greater on wide plates than narrow ones. The allowable variation in the weights of sheared plates is shown in Section 8. Allowable shearing variations, both from mill and from warehouse, should also be noted.

Sheets are sold on the basis of actual scale weight. Differences in the spring and in the temperature of the rolls will account for some variations and resulting slight differences between actual weights and weights shown on standard tables. Certain variations in sheets are allowed and are shown in Section 8. For this reason, tables should be used to check invoiced weights only when these variations are kept in mind.

9—WEIGHTS

	Page
Iron and Steel, Standard Gauges	901
Bands and Hoops	902
Bars, Flat Rolled Steel	904
Bars, Round Edge Flat	906
Bars, Round	908
Bars, Square	909
Bars, Oval	910
Bars, Half Oval	911
Bolts, Machine	912
Screws, Coach and Lag	913
Nuts, U. S. Standard Hot Pressed	913
Rivets, Round Head	914
Bolts, Round Head	914
Tubing, Seamless Steel	915
Circles, Steel	916
Sheets, Black Steel	918
Sheets, Galvanized Steel	920
Sheets, Corrugated	922
Plate, Iron and Steel	922

ASSOCIATED SUBJECTS

WEIGHTS OF	Section
Bronze	§ 4
Washers	§ 5
Expanded Metal	§ 6
Lath	§ 6
Pipe	§ 8
Steel	§ 8
Beams, Bethlehem	§11
Angles	§11
Beams	§11
Channels	§11
Columns	§11
Girders	§11
Tees	§11
Standpipes	§12
Tubes	§12

Complete Alphabetical Index will be found on last four pages of the book.

WEIGHTS OF IRON AND STEEL
STANDARD GAUGES

No. of Gauge	U. S. STANDARD GAUGE				BIRMINGHAM GAUGE			
	Thickness in Inches		Weight Square Foot		No. of Gauge	Thickness in Inches	Weight Square Foot	
	Fractions	Decimals	Iron	Steel			Iron	Steel
7-0's	1-2	.5	20.00	20.4	.....	.....	.....	.....
6-0's	15-32	.46875	18.75	19.125	.....	.....	.....	.....
5-0's	7-16	.4375	17.50	17.85	.....	.....	.....	.....
4-0's	13-32	.40625	16.25	16.575	0000	.454	18.22	18.46
000	3-8	.375	15.	15.30	000	.425	17.05	17.28
00	11-32	.34375	13.75	14.025	00	.38	15.25	15.45
0	5-16	.3125	12.50	12.75	0	.34	13.64	13.82
1	9-32	.28125	11.25	11.475	1	.3	12.04	12.20
2	17-64	.265625	10.625	10.8375	2	.284	11.40	11.55
3	1-4	.25	10.	10.2	3	.259	10.39	10.53
4	15-64	.234375	9.375	9.5625	4	.238	9.55	9.68
5	7-32	.21875	8.75	8.925	5	.22	8.83	8.95
6	13-64	.203125	8.125	8.2875	6	.203	8.15	8.25
7	3-16	.1875	7.5	7.65	7	.18	7.22	7.32
8	11-64	.171875	6.875	7.0125	8	.165	6.62	6.71
9	5-32	.15625	6.25	6.375	9	.148	5.94	6.02
10	9-64	.140625	5.625	5.7375	10	.134	5.38	5.45
11	1-8	.125	5.	5.1	11	.12	4.82	4.88
12	7-64	.109375	4.375	4.4625	12	.109	4.37	4.43
13	3-32	.09375	3.75	3.825	13	.095	3.81	3.86
14	5-64	.078125	3.125	3.1875	14	.083	3.33	3.37
15	9-128	.0703125	2.8125	2.86875	15	.072	2.89	2.93
16	1-16	.0625	2.5	2.55	16	.065	2.61	2.64
17	9-160	.05625	2.25	2.295	17	.058	2.33	2.36
18	1-20	.05	2.	2.04	18	.049	1.97	1.99
19	7-160	.04375	1.75	1.785	19	.042	1.69	1.71
20	3-80	.037	1.50	1.53	20	.035	1.40	1.42
21	11-320	.03475	1.375	1.4025	21	.032	1.28	1.30
22	1-32	.03125	1.25	1.275	22	.028	1.12	1.14
23	9-320	.028125	1.125	1.1475	23	.025	1.00	1.02
24	1-40	.025	1.	1.02	24	.022	.883	.895
25	7-320	.021875	.865	.8925	25	.02	.803	.813
26	3-160	.01875	.75	.765	26	.018	.722	.732
27	11-640	.0171875	.6875	.70125	27	.016	.642	.651
28	1-64	.015625	.625	.6375	28	.014	.562	.569
29	9-640	.0140625	.5625	.57375	29	.013	.....	.....
30	1-80	.0125	.5	.51	30	.012	.....	.....
31	7-640	.010985	.4375	.44625	31	.01	.....	.....
32	13-1280	.01045625	.40625	.414375	32	.009	.....	.....
33	3-320	.009375	.375	.3825	33	.008	.....	.....
34	11-1280	.00859375	.34375	.350625	34	.007	.....	.....
35	5-640	.0078125	.3125	.31875	35	.005	.....	.....
36	9-1280	.00703125	.28125	.286875	36	.004	.....	.....
37	17-2560	.00664062	.265625	.2709375	.....	.....	.....	.....
38	1-160	.00625	.25	.255	.....	.....	.....	.....

Sheet mills roll iron and steel sheets to U. S. Standard Gauge. Plate mills usually roll to Birmingham Gauge, unless otherwise ordered. Bands and hoops, cold rolled strip steel and spring steel are rolled to Birmingham Gauge.

Estimating weights, see page 922.

Variations in weight of sheared plates, see page 843.

ESTIMATED WEIGHTS OF STEEL BANDS AND HOOPS

APPROXIMATE WEIGHT PER LINEAL FOOT IN POUNDS. BIRMINGHAM WIRE GAUGE

Width	Thickness, B. W. G. and Inches																		
	¼	5/16	No. 8	No. 9	No.10	No. 11	No. 12	No. 13	No. 14	No. 15	No. 16	No. 17	No. 18	No. 19	No. 20	No. 21	No. 22	No. 23	No. 24
⅜	.3188	.2391	.2104	.1887	.1709	.1530	.1390	.1211	.1058	.0918	.0829	.0740	.0625	.0536	.0446	.0408	.0357	.0319	.0281
½	.3719	.2789	.2454	.2202	.1993	.1785	.1621	.1413	.1235	.1071	.0967	.0863	.0729	.0625	.0521	.0476	.0417	.0372	.0327
⅝	.4250	.3188	.2805	.2516	.2278	.2040	.1853	.1615	.1411	.1224	.1105	.0986	.0833	.0714	.0595	.0544	.0476	.0425	.0374
¾	.4781	.3586	.3156	.2831	.2563	.2295	.2085	.1817	.1587	.1377	.1243	.1109	.0937	.0803	.0669	.0612	.0536	.0478	.0421
⅞	.5313	.3984	.3506	.3145	.2848	.2550	.2316	.2019	.1764	.1530	.1381	.1233	.1041	.0893	.0744	.0680	.0595	.0531	.0468
1	.5844	.4383	.3857	.3460	.3132	.2805	.2548	.2221	.1940	.1683	.1519	.1356	.1145	.0982	.0818	.0748	.0655	.0584	.0514
1¼	.6375	.4781	.4208	.3774	.3417	.3060	.2780	.2423	.2117	.1836	.1658	.1479	.1250	.1071	.0893	.0816	.0714	.0638	.0561
1½	.7438	.5578	.4909	.4403	.3987	.3570	.3243	.2826	.2469	.2142	.1934	.1726	.1458	.1250	.1041	.0952	.0833	.0744	.0655
1	.8500	.6375	.5610	.5032	.4556	.4080	.3706	.3230	.2822	.2448	.2210	.1972	.1666	.1428	.1190	.1088	.0952	.0850	.0748
1⅛	.9563	.7172	.6311	.5661	.5126	.4590	.4169	.3634	.3175	.2754	.2486	.2219	.1874	.1607	.1339	.1224	.1071	.0956	.0842
1¼	1.0625	.7969	.7013	.6290	.5695	.5100	.4633	.4038	.3528	.3060	.2763	.2465	.2083	.1785	.1488	.1360	.1190	.1063	.0935
1⅜	1.169	.877	.7714	.6919	.6265	.5610	.5096	.4441	.3880	.3366	.3039	.2712	.2291	.1964	.1636	.1496	.1309	.1169	.1029
1½	1.275	.956	.8415	.7548	.6834	.6120	.5559	.4845	.4233	.3672	.3315	.2958	.2499	.2142	.1785	.1632	.1428	.1275	.1122
1⅝	1.381	1.036	.9116	.8177	.7404	.6630	.6022	.5249	.4586	.3978	.3591	.3205	.2707	.2321	.1934	.1768	.1547	.1381	.1216
1¾	1.488	1.116	.9818	.8806	.7973	.7140	.6486	.5653	.4939	.4284	.3868	.3451	.2916	.2499	.2083	.1904	.1666	.1488	.1309
1⅞	1.594	1.195	1.0519	.9435	.8543	.7650	.6949	.6056	.5291	.4590	.4144	.3698	.3124	.2678	.2231	.2040	.1785	.1594	.1403
2	1.700	1.275	1.1220	1.0064	.9112	.8160	.7412	.8460	.5644	.4896	.4420	.3944	.3332	.2856	.2380	.2176	.1904	.1700	.1496
2⅛	1.806	1.355	1.1921	1.0693	.9682	.8670	.7875	.6864	.5997	.5202	.4696	.4191	.3540	.3035	.2529	.2312	.2023	.1806	.1590
2¼	1.913	1.434	1.2623	1.1322	1.0251	.9180	.8339	.7268	.6350	.5508	.4973	.4437	.3749	.3213	.2678	.2448	.2142	.1913	.1683
2⅜	2.019	1.514	1.3324	1.1951	1.0821	.9690	.8802	.7671	.6702	.5814	.5249	.4684	.3957	.3392	.2826	.2584	.2261	.2019	.1777
2½	2.125	1.594	1.4025	1.2580	1.1390	1.0200	.9265	.8075	.7055	.6120	.5525	.4930	.4165	.3570	.2925	.2720	.2380	.2125	.1870
2⅝	2.231	1.673	1.4726	1.3209	1.1960	1.0710	.9728	.8479	.7408	.6426	.5801	.5177	.4373	.3749	.3124	.2856	.2499	.2231	.1964
2¾	2.338	1.753	1.5428	1.3838	1.2529	1.1220	1.0192	.8883	.7761	.6732	.6078	.5423	.4582	.3927	.3273	.2992	.2618	.2338	.2057
2⅞	2.444	1.833	1.6129	1.4467	1.3099	1.1730	1.0655	.9286	.8113	.7038	.6354	.5670	.4790	.4106	.3421	.3128	.2737	.2444	.2151

ESTIMATED WEIGHTS OF STEEL BANDS AND HOOPS — CONTINUED

APPROXIMATE WEIGHT PER LINEAL FOOT IN POUNDS. BIRMINGHAM WIRE GAUGE

Width	Thickness, B. W. G. and Inches																		
	¼	5/16	No.8	No. 9	No. 10	No. 11	No. 12	No. 13	No. 14	No. 15	No. 16	No. 17	No. 18	No. 19	No. 20	No. 21	No. 22	No. 23	No. 24
3	2.550	1.913	1.6830	1.5096	1.3668	1.2240	1.1118	.9690	.8466	.7344	.6630	.5916	.4998	.4284	.3570	.3264	.2856	.2550	.2244
3 1/16	2.656	1.992	1.7531	1.5725	1.4238	1.2750	1.1581	1.0094	.8819	.7650	.6906	.6163	.5206	.4463	.3719	.3400	.2975	.2656	.2338
3 1/8	2.763	2.072	1.8233	1.6354	1.4807	1.3260	1.2045	1.0498	.9172	.7956	.7183	.6409	.5415	.4641	.3868	.3536	.3094	.2763	.2431
3 3/16	2.869	2.152	1.8934	1.6983	1.5377	1.3770	1.2508	1.0901	.9524	.8262	.7459	.6656	.5623	.4820	.4016	.3672	.3213	.2869	.2525
3 1/4	2.975	2.231	1.9635	1.7612	1.5946	1.4280	1.2971	1.1305	.9877	.8568	.7735	.6902	.5831	.4998	.4165	.3808	.3332	.2975	.2618
3 5/16	3.081	2.311	2.0336	1.8241	1.6516	1.4790	1.3434	1.1709	1.0230	.8874	.8011	.7149	.6039	.5177	.4314	.3944	.3451	.3081	.2712
3 3/8	3.188	2.391	2.1038	1.8870	1.7085	1.5300	1.3898	1.2113	1.0583	.9180	.8288	.7395	.6248	.5355	.4463	.4080	.3570	.3188	.2805
3 7/16	3.294	2.470	2.1739	1.9499	1.7655	1.5810	1.4361	1.2516	1.0935	.9486	.8564	.7642	.6456	.5534	.4611	.4216	.3689	.3294	.2899
4	3.400	2.55	2.2440	2.0128	1.8224	1.6320	1.4824	1.2920	1.1288	.9792	.8840	.7888	.6664	.5712	.4760	.4352	.3808	.3400	.2992
4 1/16	3.506	2.630	2.3141	2.0757	1.8794	1.6830	1.5287	1.3324	1.1641	1.0098	.9116	.8135	.6872	.5891	.4909	.4488	.3927	.3506	.3086
4 1/8	3.613	2.709	2.3843	2.1386	1.9363	1.7340	1.5751	1.3728	1.1994	1.0404	.9393	.8381	.7081	.6069	.5058	.4624	.4046	.3613	.3179
4 3/16	3.719	2.789	2.4544	2.2015	1.9933	1.7850	1.6214	1.4131	1.2346	1.0710	.9669	.8628	.7289	.6248	.5206	.4760	.4165	.3719	.3273
4 1/4	3.825	2.869	2.5245	2.2644	2.0502	1.8360	1.6677	1.4535	1.2699	1.1016	.9945	.8874	.7497	.6426	.5355	.4896	.4284	.3825	.3366
4 5/16	3.931	2.948	2.5946	2.3273	2.1072	1.8870	1.7140	1.4939	1.3052	1.1322	1.0221	.9121	.7705	.6605	.5504	.5032	.4403	.3931	.3460
4 3/8	4.038	3.028	2.6648	2.3902	2.1641	1.9380	1.7604	1.5343	1.3405	1.1628	1.0498	.9367	.7914	.6783	.5653	.5168	.4522	.4038	.3553
4 7/16	4.144	3.108	2.7349	2.4531	2.2212	1.9890	1.8067	1.5746	1.3757	1.1934	1.0774	.9614	.8122	.6962	.5801	.5304	.4641	.4144	.3647
5	4.250	3.188	2.8050	2.5160	2.2780	2.0400	1.8530	1.6150	1.4110	1.2240	1.1050	.9860	.8330	.7140	.5950	.5440	.4760	.4250	.3740
5 1/16	4.356	3.267	2.8751	2.5789	2.3350	2.0910	1.8993	1.6554	1.4463	1.2546	1.1326	1.0107	.8538	.7319	.6099	.5576	.4879	.4356	.3834
5 1/8	4.463	3.347	2.9453	2.6418	2.3919	2.1420	1.9457	1.6958	1.4816	1.2852	1.1603	1.0353	.8747	.7497	.6248	.5712	.4998	.4463	.3927
5 3/16	4.569	3.427	3.0154	2.7047	2.4489	2.1930	1.9920	1.7361	1.5168	1.3158	1.1879	1.0600	.8955	.7676	.6396	.5848	.5117	.4569	.4021
5 1/4	4.675	3.506	3.0855	2.7676	2.5058	2.2440	2.0383	1.7765	1.5521	1.3464	1.2155	1.0846	.9163	.7854	.6545	.5984	.5236	.4675	.4114
5 5/16	4.781	3.586	3.1556	2.8305	2.5628	2.2950	2.0846	1.8169	1.5874	1.3770	1.2431	1.1093	.9371	.8033	.6694	.6120	.5355	.4781	.4208
5 3/8	4.888	3.666	3.2258	2.8934	2.6197	2.3460	2.1310	1.8573	1.6227	1.4076	1.2708	1.1339	.9580	.8211	.6843	.6256	.5474	.4888	.4301
5 7/16	4.994	3.745	3.2959	2.9563	2.6767	2.3970	2.1773	1.8976	1.6579	1.4382	1.2984	1.1586	.9788	.8390	.6991	.6392	.5593	.4994	.4395
6	5.100	3.825	3.3660	3.0192	2.7336	2.4480	2.2236	1.9380	1.6932	1.4688	1.3260	1.1832	.9996	.8568	.7140	.6528	.5712	.5100	.4488

*WEIGHT OF FLAT ROLLED STEEL — POUNDS PER LINEAL FOOT

Thickness, Inches	Width—Inches																						
	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/16	1 1/8	1 3/16	1 1/4	1 5/16	1 3/8	1 7/16	1 1/2	1 9/16	1 5/8	1 11/16	1 3/4	1 13/16	1 7/8
1/64	.319	.398	.478	.558	.638	.717	.797	.877	.956	1.04	1.12	1.28	1.43	1.59	1.75	1.91	2.07	2.23	2.39	2.55	2.71	2.87	3.03
1/32	.425	.531	.637	.744	.850	.956	1.06	1.17	1.28	1.38	1.49	1.70	1.91	2.13	2.34	2.55	2.76	2.98	3.19	3.40	3.61	3.83	4.04
3/64	.531	.664	.797	.930	1.06	1.20	1.33	1.46	1.59	1.73	1.86	2.13	2.39	2.66	2.92	3.19	3.45	3.72	3.98	4.25	4.52	4.78	5.05
1/16	.638	.797	.956	1.116	1.28	1.43	1.59	1.75	1.91	2.07	2.23	2.55	2.87	3.19	3.51	3.83	4.14	4.46	4.78	5.10	5.42	5.74	6.06
5/64	.744	.930	1.116	1.302	1.49	1.67	1.86	2.05	2.23	2.42	2.60	2.98	3.35	3.72	4.09	4.46	4.83	5.21	5.58	5.95	6.32	6.69	7.07
3/32	.850	1.06	1.275	1.49	1.70	1.91	2.12	2.34	2.55	2.76	2.98	3.40	3.83	4.25	4.68	5.10	5.53	5.95	6.38	6.80	7.22	7.65	8.08
7/64	.956	1.20	1.434	1.67	1.91	2.15	2.39	2.63	2.87	3.11	3.35	3.83	4.30	4.78	5.26	5.74	6.22	6.69	7.17	7.65	8.13	8.61	9.08
1/8	1.06	1.33	1.594	1.86	2.13	2.39	2.65	2.92	3.19	3.45	3.72	4.25	4.78	5.31	5.84	6.38	6.91	7.44	7.97	8.50	9.03	9.56	10.09
9/64	1.17	1.46	1.753	2.05	2.34	2.63	2.92	3.21	3.51	3.80	4.09	4.68	5.26	5.84	6.43	7.01	7.60	8.18	8.77	9.35	9.93	10.52	11.10
5/32	1.28	1.60	1.913	2.23	2.55	2.87	3.19	3.51	3.83	4.14	4.46	5.10	5.76	6.38	7.01	7.65	8.29	8.93	9.56	10.20	10.84	11.48	12.11
11/64	1.38	1.73	2.072	2.42	2.76	3.11	3.45	3.80	4.14	4.49	4.83	5.53	6.22	6.91	7.60	8.29	8.98	9.67	10.36	11.05	11.74	12.43	13.12
3/16	1.49	1.86	2.231	2.60	2.98	3.35	3.72	4.09	4.46	4.83	5.21	5.95	6.69	7.44	8.18	8.93	9.67	10.41	11.16	11.90	12.64	13.39	14.13
13/64	1.59	1.99	2.391	2.79	3.19	3.59	3.98	4.38	4.78	5.18	5.58	6.38	7.17	7.97	8.77	9.56	10.36	11.16	11.95	12.75	13.55	14.34	15.14
1	1.70	2.13	2.55	2.98	3.40	3.83	4.25	4.68	5.10	5.53	5.95	6.80	7.65	8.50	9.35	10.20	11.05	11.90	12.75	13.60	14.45	15.30	16.15
1 1/64	1.81	2.26	2.71	3.16	3.61	4.06	4.52	4.97	5.42	5.87	6.32	7.23	8.13	9.03	9.93	10.84	11.74	12.64	13.55	14.45	15.35	16.26	17.16
1 1/32	1.91	2.38	2.87	3.35	3.83	4.30	4.78	5.26	5.74	6.22	6.69	7.65	8.61	9.56	10.52	11.48	12.43	13.39	14.34	15.30	16.26	17.21	18.17
1 1/64	2.02	2.52	3.03	3.53	4.04	4.54	5.05	5.55	6.06	6.56	7.07	8.08	9.08	10.09	11.10	12.13	13.12	14.13	15.14	16.15	17.16	18.17	19.18
1 1/16	2.13	2.65	3.19	3.72	4.25	4.78	5.31	5.84	6.38	6.91	7.44	8.50	9.56	10.63	11.69	12.75	13.81	14.88	15.94	17.00	18.06	19.13	20.19
1 3/64	2.23	2.79	3.35	3.91	4.46	5.02	5.58	6.14	6.69	7.25	7.81	8.93	10.04	11.16	12.27	13.39	14.50	15.62	16.73	17.85	18.97	20.08	21.20
1 1/32	2.34	2.92	3.51	4.09	4.68	5.26	5.84	6.43	7.01	7.60	8.18	9.35	10.52	11.69	12.86	14.03	15.19	16.36	17.53	18.70	19.87	21.04	22.21
1 5/64	2.44	3.06	3.67	4.28	4.89	5.50	6.11	6.72	7.33	7.94	8.55	9.78	11.00	12.22	13.44	14.66	15.88	17.11	18.33	19.55	20.77	21.99	23.22
1 1/8	2.55	3.19	3.83	4.46	5.10	5.74	6.38	7.01	7.65	8.29	8.93	10.20	11.48	12.75	14.03	15.30	16.58	17.85	19.13	20.40	21.68	22.95	24.23
1 3/64	2.66	3.32	3.98	4.65	5.31	5.98	6.64	7.30	7.97	8.63	9.30	10.63	11.95	13.28	14.61	15.92	17.27	18.59	19.92	21.25	22.58	23.91	25.23
1 1/32	2.76	3.45	4.14	4.83	5.52	6.22	6.90	7.60	8.29	8.98	9.67	11.05	12.43	13.81	15.19	16.58	17.96	19.34	20.72	22.10	23.48	24.86	26.24
1 1/16	2.87	3.59	4.30	5.02	5.74	6.45	7.17	7.89	8.61	9.32	10.04	11.48	12.91	14.34	15.78	17.21	18.65	20.08	21.52	22.95	24.38	25.82	27.25
1 3/64	2.98	3.72	4.46	5.21	5.95	6.69	7.44	8.18	8.93	9.67	10.41	11.90	13.39	14.88	16.36	17.85	19.34	20.83	22.31	23.80	25.29	26.78	28.26
1 1/32	3.08	3.85	4.62	5.39	6.16	6.93	7.70	8.47	9.24	10.01	10.78	12.33	13.87	15.41	16.95	18.49	20.03	21.57	23.11	24.65	26.19	27.73	29.27
1 5/64	3.19	3.98	4.78	5.58	6.38	7.17	7.97	8.77	9.56	10.36	11.16	12.75	14.34	15.94	17.53	19.13	20.72	22.31	23.91	25.50	27.09	28.69	30.28
1 1/16	3.29	4.12	4.94	5.76	6.59	7.41	8.23	9.06	9.88	10.70	11.53	13.18	14.82	16.47	18.12	19.76	21.41	23.06	24.70	26.35	28.00	29.64	31.29
2	3.40	4.25	5.10	5.95	6.80	7.65	8.50	9.35	10.20	11.05	11.90	13.60	15.30	17.00	18.70	20.40	22.10	23.80	25.50	27.20	28.90	30.60	32.30

Thickness, Inches	Width—Inches																						
	1 15/16	2	2 1/16	2 1/8	2 3/16	2 1/4	2 5/16	2 3/8	2 7/16	2 1/2	2 9/16	2 5/8	2 11/16	2 3/4	2 13/16	2 7/8	2 15/16	3	3 1/16	3 1/8	3 3/16	3 1/4	3 5/16	3 3/8
1/64	3.19	3.40	3.61	3.83	4.04	4.25	4.46	4.68	4.89	5.10	5.31	5.53	5.74	5.95	6.16	6.38	6.59	6.80	7.01	7.22	7.44	7.65	7.86	8.08
1/32	4.25	4.52	4.78	5.05	5.31	5.57	5.84	6.10	6.37	6.63	6.90	7.16	7.43	7.69	7.96	8.22	8.49	8.75	9.02	9.28	9.55	9.81	10.08	10.34
3/64	5.31	5.65	5.97	6.31	6.64	6.97	7.30	7.63	7.96	8.29	8.63	8.95	9.28	9.61	9.95	10.28	10.61	10.94	11.27	11.61	11.94	12.27	12.60	12.93
1/16	6.38	6.78	7.17	7.57	7.97	8.36	8.76	9.16	9.55	9.95	10.34	10.74	11.14	11.53	11.93	12.33	12.72	13.12	13.52	13.91	14.31	14.71	15.10	15.50
5/64	7.44	7.91	8.36	8.83	9.30	9.75	10.22	10.69	11.14	11.61	12.08	12.53	13.00	13.47	13.92	14.39	14.86	15.31	15.78	16.25	16.70	17.17	17.64	18.09
3/32	8.50	9.04	9.56	10.09	10.63	11.15	11.68	12.21	12.73	13.26	13.80	14.32	14.85	15.38	15.90	16.43	16.97	17.49	18.02	18.55	19.07	19.60	20.14	20.66
7/64	9.56	10.17	10.76	11.35	11.96	12.54	13.14	13.74	14.32	14.92	15.53	16.11	16.71	17.31	17.89	18.49	19.09	19.68	20.27	20.87	21.46	22.06	22.65	23.24
1/8	10.63	11.30	11.96	12.62	13.28	13.94	14.60	15.26	15.92	16.58	17.25	17.91	18.57	19.23	19.89	20.55	21.21	21.87	22.53	23.19	23.85	24.51	25.17	25.83
9/64	11.69	12.43	13.16	13.88	14.61	15.34	16.06	16.79	17.51	18.24	18.97	19.70	20.42	21.15	21.87	22.60	23.33	24.06	24.78	25.51	26.23	26.96	27.69	28.41
5/32	12.75	13.56	14.35	15.14	15.94	16.73	17.52	18.31	19.11	19.90	20.69	21.48	22.28	23.07	23.86	24.65	25.45	26.24	27.03	27.82	28.62	29.41	30.20	30.99
11/64	13.81	14.69	15.55	16.41	17.27	18.13	18.98	19.84	20.70	21.56	22.42	23.28	24.13	24.99	25.85	26.71	27.57	28.43	29.28	30.14	31.00	31.86	32.72	33.57
3/16	14.88	15.82	16.75	17.68	18.61	19.54	20.47	21.40	22.33	23.26	24.19	25.12	26.05	26.98	27.91	28.84	29.77	30.70	31.63	32.56	33.49	34.42	35.35	36.28
13/64	15.94	16.95	17.95	18.95	19.95	20.95	21.95	22.95	23.94	24.94	25.94	26.94	27.94	28.94	29.94	30.94	31.94	32.94	33.94	34.94	35.94	36.94	37.94	38.94
1	17.00	18.08	19.13	20.19	21.25	22.31	23.38	24.44	25.50	26.56	27.63	28.69	29.75	30.81	31.88	32.94	34.00	35.06	36.13	37.19	38.25	39.31	40.38	41.44
1 1/64	18.06	19.13	20.19	21.25	22.31	23.38	24.44	25.50	26.56	27.63	28.69	29.75	30.81	31.88	32.94	34.00	35.06	36.13	37.19	38.25	39.31	40.38	41.44	42.50
1 1/32	19.13	20.25	21.36	22.48	23.59	24.71	25.82	26.93	28.05	29.16	30.28	31.39	32.50	33.62	34.73	35.85	36.96	38.07	39.19	40.30	41.42	42.53	43.64	44.76
1 3/64	20.19	21.36	22.53	23.70	24.87	26.04	27.21	28.38	29.55	30.72	31.89	33.06	34.23	35.40	36.57	37.74	38.91	40.08	41.25	42.42	43.59	44.76	45.93	47.10
1 1/16	21.25	22.48	23.70	24.93	26.16	27.38	28.61	29.84	31.06	32.29	33.52	34.74	35.97	37.20	38.42	39.65	40.88	42.10	43.33	44.56	45.78	47.01	48.24	49.46
1 5/64	22.31	23.59	24.87	26.16	27.44	28.72	30.01	31.29	32.57	33.86	35.14	36.42	37.71	38.99	40.27	41.56	42.84	44.12	45.41	46.69	47.97	49.26	50.54	51.82
1 1/8	23.38	24.71	26.04	27.38	28.72	30.05	31.39	32.72	34.06	35.40	36.73	38.07	39.40	40.74	42.08	43.41	44.75	46.08	47.42	48.76	50.09	51.43	52.76	54.10
1 3/64	24.44	25.82	27.21	28.61	30.01	31.39	32.79	34.18	35.57	36.97	38.36	39.75	41.15	42.54	43.93	45.33	46.72	48.12	49.51	50.90	52.30	53.69	55.09	56.48
1 1/32	25.50	26.93	28.38	29.84	31.29	32.72	34.18	35.63	37.08	38.54	39.99	41.44	42.90	44.35	45.80	47.26	48.71	50.16	51.62	53.07	54.53	55.98	57.43	58.89
1 5/64	26.56	28.05	29.55	31.06	32.57	34.06	35.57	37.08	38.58	40.09	41.60	43.10	44.61	46.12	47.62	49.13	50.64	52.14	53.65	55.16	56.66	58.17	59.68	61.18
1 1/16	27.63	29.16	30.72	32.29	33.86	35.40	36.97	38.54	40.09	41.67	43.23	44.80	46.36	47.93	49.49	51.06	52.62	54.19	55.75	57.32	58.88	60.45	62.01	63.58
1 3/64	28.69	30.28	31.89	33.49	35.09	36.73	38.34	39.94	41.55	43.15	44.76	46.36	47.97	49.57	51.18	52.78	54.39	55.99	57.60	59.20	60.81	62.41	64.02	65.62
1 1/32	29.75	31.39	33.06	34.73	36.40	38.07	39.74	41.40	43.07	44.74	46.41	48.08	49.74	51.41	53.08	54.75	56.42	58.08	59.75	61.42	63.09	64.76	66.42	68.09
1 5/64	30.81	32.50	34.23	35.97	37.71	39.40	41.15	42.90	44.61	46.36	48.12	49.86	51.61	53.36	55.10	56.85	58.60	60.34	62.09	63.84	65.58	67.33	69.08	70.82
1 1/16	31.88	33.62	35.40	37.19	38.97	40.74	42.53	44.31	46.09	47.88	49.66	51.44	53.23	55.01	56.79	58.58	60.36	62.14	63.93	65.71	67.49	69.28	71.06	72.84
2	32.94	34.73	36.57	38.42	40.27	42.08	43.93	45.78	47.62	49.46	51.32	53.15	55.01	56.85	58.70	60.54	62.39	64.23	66.08	67.92	69.77	71.61	73.46	75.30

Thickness, Inches	Width—Inches																						
	3 7/16	3 1/2	3 9/16	3 5/8	3 11/16	3 3/4	3 13/16	3 7/8	3 15/16	4	4 1/16	4 1/8	4 3/16	4 1/4	4 5/16	4 3/8	4 7/16	4 1/2	4 9/16	4 5/8	4 11/16	4 3/4	4 13/16
1/64	8.29	8.50	8.71	8.93	9.14	9.35	9.56	9.78	9.99	10.20	10.42	10.63	10.84	11.05	11.27	11.48	11.69	11.90	12.12	12.33	12.54	12.75	12.97
1/32	10.34	10.63	10.89	11.15	11.42	11.68	11.94	12.21	12.47	12.73	13.00	13.26	13.52	13.79	14.05	14.32	14.58	14.85	15.11	15.37	15.64	15.90	16.17
3/64	12.93	13.26	13.59	13.93	14.26	14.59	14.92	15.25	15.58	15.92	16.25	16.58	16.91	17.24	17.57	17.90	18.23	18.56	18.89	19.22	19.55	19.88	20.21
1/16	15.50	15.90	16.30	16.70	17.10	17.49	17.89	18.29	18.69	19.08	19.48	19.88	20.28	20.68	21.07	21.47	21.87	22.27	22.67	23.06	23.46	23.86	24.26
5/64	18.09	18.56	19.02	19.48	19.95	20.41	20.87	21.34	21.80	22.26	22.73	23.19	23.65	24.12	24.58	25.04	25.51	25.97	26.43	26.90	27.36	27.82	28.29
3/32	20.66	21.20	21.73	22.26	22.80	23.33	23.86	24.39	24.93	25.46	25.99	26.52	27.06	27.59	28.12	28.65	29.19	29.72	30.25	30.78	31.32	31.85	32.38
7/64	23.24	23.85	24.45	25.06	25.66	26.26	26.87	27.47	28.08	28.68	29.28	29.89	30.49	31.10	31.70	32.30	32.91	33.51	34.12	34.72	35.32	35.93	36.53
1/8	25.83	26.51	27.18	27.85	28.52	29.19	29.86	30.53	31.20	31.87	32.54	33.21	33.88	34.55	35.22	35.89	36.56	37.23	37.90	38.57	39.24	39.91	40.58
9/64	28.41	29.16	29.91	30.65	31.40	32.14	32.89	33.64	34.38	35.13	35.87	36.62	37.36	38.11	38.85	39.60	40.34	41.09	41.83	42.58	43.32	44.07	44.81
5/32	30.99	31.81	32.63	33.44	34.26	35.07	35.89	36.70	37.52	38.33	39.15	39.96	40.78	41.59	42.41	43.22	44.04	44.85	45.67	46.48	47.30	48.11	48.93
11/64	33.57	34.46	35.35	36.24	37.13	38.01	38.90	39.79	40.68	41.57	42.46	43.34	44.23	45.12	46.01	46.90	47.79	48.67	49.56	50.45	51.34	52.23	53.12
3/16	36.28	37.24	38.20	39.16	40.12	41.08	42.04	43.00	43.96	44.92	45.88	46.84	47.80	48.76	49.72	50.68	51.64	52.60	53.56	54.52	55.48	56.44	57.40
13/64	38.94	39.96	40.98	42.00	43.02	44.04	45.06	46.08	47.10	48.12	49.14	50.16	51.18	52.20	53.22	54.24	55.26	56.28	57.30	58.32	59.34	60.36	61.38
1	41.44	42.50	43.57	44.63	45.69	46.75	47.82	48.88	49.94	51.00	52.07	53.13	54.19	55.25	56.32	57.38	58.44	59.50	60.57	61.63	62.69	63.75	64.82
1 1/64	42.50	43.59	44.67	45.76	46.85	47.93	49.02	50.11	51.19	52.28	53.37	54.45	55.54	56.63	57.71	58.80	59.89	60.97	62.06	63.15	64.23	65.32	66.41
1 1/32	43.64	44.76	45.87	46.98	48.09	49.21	50.32	51.43	52.55	53.66	54.77	55.89	57.00	58.11	59.23	60.34	61.45	62.57	63.68	64.79	65.91	67.02	68.13
1 3/64	44.76	45.93	47.09	48.26	49.42	50.59	51.75	52.92	54.08	55.25	56.41	57.58	58.74	59.91	61.07	62.24	63.40	64.57	65.73	66.90	68.06	69.23	70.39
1 1/16	45.88	47.09	48.30	49.51	50.72	51.93	53.14	54.35	55.56	56.77	57.98	59.19	60.40	61.61	62.82	64.03	65.24	66.45	67.66	68.87	70.08	71.29	72.50
1 5/64	47.01	48.24	49.46	50.69	51.91	53.14	54.36	55.59	56.81	58.04	59.26	60.49	61.71	62.94	64.16	65.39	66.61	67.84	69.06	70.29	71.51	72.74	73.96
1 1/8	48.13	49.40	50.66	51.93	53.19	54.46	55.72	56.99	58.25	59.52	60.78	62.05	63.31	64.58	65.84	67.11	68.37	69.64	70.90	72.17	73.43	74.70	75.96
1 3/64	49.26	50.55	51.84	53.13	54.42	55.71	57.00	58.29	59.58	60.87	62.16	63.45	64.74	66.03	67.32	68.61	69.90	71.19	72.48	73.77	75.06	76.35	77.64
1 1/32	50.38	51.71	53.03	54.36	55.68	57.01	58.33	59.66	60.98	62.31	63.63	64.96	66.28	67.61	68.93	70.26	71.58	72.91	74.23	75.56	76.88	78.21	79.53
1 5/64	51.51	52.86	54.21	55.56	56.91	58.26	59.61	60.96	62.31	63.66	65.01	66.36	67.71	69.06	70.41	71.76	73.11	74.46	75.81	77.16	78.51	79.86	81.21
1 1/16	52.63	54.02	55.40	56.78	58.17	59.55	60.93	62.32	63.70	65.08	66.46	67.85	69.23	70.61	72.00	73.38	74.76	76.15	77.53	78.91	80.30	81.68	83.06
1 3/64	53.76	55.17	56.58	57.99	59.40	60.81	62.22	63.63	65.04	66.45	67.86	69.27	70.68	72.09	73.50	74.91	76.32	77.73	79.14	80.55	81.96	83.37	84.78
1 1/32	54.88	56.32	57.76	59.20	60.64	62.08	63.52	64.96	66.40	67.84	69.28	70.72	72.16	73.60	75.04	76.48	77.92	79.36	80.80	82.24	83.68	85.12	86.56
1 5/64	56.01	57.47	58.93	60.40	61.86	63.32	64.79	66.25	67.71	69.18	70.64	72.10	73.57	75.03	76.49	77.96	79.42	80.88	82.35	83.81	85.27	86.74	88.20
1 1/16	57.13	58.63	60.12	61.61	63.11	64.60	66.09	67.59	69.08	70.57	72.07	73.56	75.05	76.55	78.04	79.53	81.03	82.52	84.01	85.51	87.00	88.49	89.99
1 3/64	58.26	59.78	61.30	62.82	64.33	65.85	67.37	68.89	70.41	71.93	73.44	74.96	76.48	78.00	79.52	81.03	82.55	84.07	85.59	87.11	88.62	90.14	91.66
1 1/32	59.38	60.93	62.48	64.03	65.58	67.13	68.68	70.23	71.78	73.33	74.88	76.43	77.98	79.53	81.08	82.63	84.18	85.73	87.28	88.83	90.38	91.93	93.48
1 5/64	60.51	62.09	63.67	65.25	66.83	68.41	69.99	71.57	73.15	74.73	76.31	77.89	79.47	81.05	82.63	84.21	85.79	87.37	88.95	90.53	92.11	93.69	95.27
1 1/16	61.63	63.24	64.85	66.46	68.07	69.68	71.29	72.90	74.51	76.12	77.73	79.34	80.95	82.56	84.17	85.78	87.39	89.00	90.61	92.22	93.83	95.44	97.05
1 3/64	62.76	64.39	66.03	67.66	69.30	70.93	72.57	74.20	75.84	77.47	79.11	80.74	82.38	84.01	85.65	87.28	88.92	90.55	92.19	93.82	95.46	97.09	98.73
1 1/32	63.88	65.55	67.21	68.88	70.54	72.21	73.87	75.54	77.20	78.87	80.53	82.20	83.86	85.53	87.19	88.86	90.52	92.19	93.85	95.52	97.18	98.85	100.51
1 5/64	65.01	66.70	68.39	70.08	71.77	73.46	75.15	76.84	78.53	80.22	81.91	83.60	85.29	86.98	88.67	90.36	92.05	93.74	95.43	97.12	98.81	100.50	102.19
1 1/16	66.13	67.86	69.58	71.31	73.03	74.76	76.48	78.21	79.93	81.66	83.38	85.11	86.83	88.56	90.28	92.01	93.73	95.46	97.18	98.91	100.63	102.36	104.08
1 3/64	67.26	69.01	70.76	72.51	74.26	76.01	77.76	79.51	81.26	83.01	84.76	86.51	88.26	90.01	91.76	93.51	95.26	97.01	98.76	100.51	102.26	104.01	105.76
1 1/32	68.38	70.17	71.95	73.74	75.52	77.31	79.09	80.88	82.66	84.45	86.23	88.02	89.80	91.59	93.37	95.16	96.94	98.73	100.51	102.30	104.08	105.87	107.65
1 5/64	69.51	71.32	73.13	74.94	76.75	78.56	80.37	82.18	83.99	85.80	87.61	89.42	91.23	93.04	94.85	96.66	98.47	100.28	102.09	103.90	105.71	107.52	109.33
1 1/16	70.63	72.48	74.32	76.17	78.01	79.86	81.70	83.55	85.39	87.24	89.08	90.93	92.77	94.62	96.46	98.31	100.15	102.00	103.84	105.69	107.53	109.38	111.22
1 3/64	71.76	73.63	75.50	77.37	79.24	81.11	82.98	84.85	86.72	88.59	90.46	92.33	94.20	96.07	97.94	99.81	101.68	103.55	105.42	107.29	109.16	111.03	112.90
1 1/32	72.88	74.78	76.68	78.57	80.47	82.36	84.26	86.16	88.05	89.95	91.84	93.74	95.64	97.53	99.43	101.32	103.22	105.12	107.01	108.91	110.80	112.70	114.60
1 5/64	74.01	75.94	77.86	79.78	81.70	83.62	85.54	87.46	89.38	91.31	93

*WEIGHT OF FLAT ROLLED STEEL—CONTINUED

Thickness, Inches	Width—Inches																							
	5¼	5½	5¾	6	6¼	6½	6¾	7	7¼	7½	7¾	8	8¼	8½	8¾	9	9¼	9½	9¾	10	10¼	10½	11	12
1/16	3.35	3.51	3.67	3.83	3.98	4.14	4.30	4.46	4.62	4.78	4.94	5.10	5.26	5.42	5.58	5.74	5.90	6.06	6.22	6.38	6.53	6.69	7.01	7.65
1/8	4.46	4.68	4.89	5.10	5.31	5.53	5.74	5.95	6.16	6.38	6.59	6.80	7.01	7.23	7.44	7.65	7.86	8.08	8.29	8.50	8.71	8.93	9.35	10.20
3/16	5.58	5.84	6.11	6.38	6.64	6.91	7.17	7.44	7.70	7.97	8.23	8.50	8.77	9.03	9.30	9.56	9.83	10.09	10.36	10.63	10.89	11.16	11.69	12.75
1/4	6.69	7.01	7.33	7.65	7.97	8.29	8.61	8.93	9.24	9.56	9.88	10.20	10.52	10.84	11.16	11.48	11.79	12.11	12.43	12.75	13.07	13.39	14.03	15.30
5/16	7.81	8.18	8.55	8.93	9.30	9.67	10.04	10.41	10.78	11.16	11.53	11.90	12.27	12.64	13.02	13.39	13.76	14.13	14.50	14.88	15.25	15.62	16.36	17.85
3/8	8.93	9.35	9.78	10.20	10.63	11.05	11.48	11.90	12.33	12.75	13.18	13.60	14.03	14.45	14.88	15.30	15.73	16.15	16.58	17.00	17.43	17.85	18.70	20.40
7/16	10.04	10.52	11.00	11.48	11.95	12.43	12.91	13.39	13.87	14.34	14.82	15.30	15.78	16.26	16.73	17.21	17.69	18.17	18.65	19.13	19.60	20.08	21.04	22.95
1/2	11.16	11.69	12.22	12.75	13.28	13.81	14.34	14.88	15.41	15.94	16.47	17.00	17.53	18.06	18.59	19.13	19.66	20.19	20.72	21.25	21.78	22.31	23.38	25.50
9/16	12.27	12.86	13.44	14.03	14.61	15.19	15.78	16.36	16.95	17.53	18.12	18.70	19.28	19.87	20.45	21.04	21.62	22.21	22.79	23.38	23.96	24.54	25.71	28.05
5/8	13.39	14.03	14.67	15.30	15.94	16.58	17.21	17.85	18.49	19.13	19.76	20.40	21.04	21.68	22.31	22.95	23.59	24.23	24.86	25.50	26.14	26.78	28.05	30.60
11/16	14.50	15.19	15.88	16.58	17.27	17.96	18.65	19.34	20.03	20.72	21.41	22.10	22.79	23.48	24.17	24.86	25.55	26.24	26.93	27.63	28.32	29.01	30.39	33.15
3/4	15.62	16.36	17.11	17.85	18.59	19.34	20.08	20.83	21.57	22.31	23.06	23.80	24.54	25.29	26.03	26.78	27.52	28.26	29.01	29.75	30.49	31.24	32.73	35.70
13/16	16.73	17.53	18.33	19.13	19.92	20.72	21.52	22.31	23.11	23.91	24.70	25.50	26.30	27.09	27.89	28.69	29.48	30.28	31.08	31.88	32.67	33.47	35.06	38.25
1	17.85	18.70	19.55	20.40	21.25	22.10	22.95	23.80	24.65	25.50	26.35	27.20	28.05	28.90	29.75	30.60	31.45	32.30	33.15	34.00	34.85	35.70	37.40	40.80
1 1/16	18.97	19.87	20.77	21.68	22.58	23.48	24.38	25.29	26.19	27.09	28.00	28.90	29.80	30.71	31.61	32.51	33.42	34.32	35.22	36.13	37.03	37.93	39.74	43.35
1 1/8	20.08	21.04	21.99	22.95	23.91	24.86	25.82	26.78	27.73	28.69	29.64	30.60	31.56	32.51	33.47	34.43	35.38	36.34	37.29	38.25	39.21	40.16	42.08	45.90
1 3/16	21.20	22.21	23.22	24.23	25.23	26.24	27.25	28.26	29.27	30.28	31.29	32.30	33.31	34.32	35.33	36.34	37.35	38.36	39.37	40.38	41.38	42.39	44.41	48.45
1 1/4	22.31	23.38	24.44	25.50	26.56	27.63	28.69	29.75	30.81	31.88	32.94	34.00	35.06	36.13	37.19	38.25	39.31	40.38	41.44	42.50	43.56	44.63	46.75	51.00
1 5/16	23.43	24.54	25.66	26.78	27.89	29.01	30.12	31.24	32.35	33.47	34.58	35.70	36.82	37.93	39.05	40.16	41.28	42.39	43.51	44.63	45.74	46.86	49.09	53.55
1 3/8	24.54	25.71	26.88	28.05	29.22	30.39	31.56	32.73	33.89	35.06	36.23	37.40	38.57	39.74	40.91	42.08	43.24	44.41	45.58	46.75	47.92	49.09	51.43	56.10
1 7/16	25.66	26.88	28.10	29.33	30.55	31.77	32.99	34.21	35.43	36.66	37.88	39.10	40.32	41.54	42.77	43.99	45.21	46.43	47.65	48.88	50.10	51.32	53.76	58.65
1 1/2	26.78	28.05	29.33	30.60	31.88	33.15	34.43	35.70	36.98	38.25	39.53	40.80	42.08	43.35	44.63	45.90	47.18	48.45	49.73	51.00	52.28	53.55	56.10	61.20
1 9/16	27.89	29.22	30.55	31.88	33.20	34.53	35.86	37.19	38.52	39.84	41.17	42.50	43.83	45.16	46.48	47.81	49.14	50.47	51.80	53.13	54.45	55.78	58.44	63.75
1 5/8	29.01	30.39	31.77	33.15	34.53	35.91	37.29	38.68	40.06	41.44	42.82	44.20	45.58	46.96	48.34	49.73	51.11	52.49	53.87	55.25	56.63	58.01	60.78	66.30
1 11/16	30.12	31.56	32.99	34.43	35.86	37.29	38.73	40.16	41.60	43.03	44.47	45.90	47.33	48.77	50.20	51.64	53.07	54.51	55.94	57.38	58.81	60.24	63.11	68.85
1 3/4	31.24	32.73	34.21	35.70	37.19	38.68	40.16	41.65	43.14	44.63	46.11	47.60	49.09	50.58	52.06	53.55	55.04	56.53	58.01	59.50	60.99	62.48	65.45	71.40
1 13/16	32.35	33.89	35.43	36.98	38.52	40.06	41.60	43.14	44.68	46.22	47.76	49.30	50.84	52.38	53.92	55.46	57.00	58.54	60.08	61.63	63.17	64.71	67.79	73.95
1 7/8	33.47	35.06	36.66	38.25	39.85	41.44	43.03	44.63	46.22	47.81	49.41	51.00	52.59	54.19	55.78	57.38	58.97	60.56	62.16	63.75	65.34	66.94	70.13	76.50
1 15/16	34.58	36.23	37.88	39.53	41.17	42.82	44.47	46.11	47.76	49.41	51.05	52.70	54.35	55.99	57.64	59.29	60.93	62.58	64.23	65.88	67.52	69.17	72.46	79.05
2	35.70	37.40	39.10	40.80	42.50	44.20	45.90	47.60	49.30	51.00	52.70	54.40	56.10	57.80	59.50	61.20	62.90	64.60	66.30	68.00	69.70	71.40	74.80	81.60

*These figures are the theoretical weights, based on 489.6 lbs. per cubic foot of steel. Iron will run about 2% lighter.

WEIGHTS OF ROUND EDGE FLATS—POUNDS PER LINEAL FOOT

The following are for over-all measurement. To figure face measurement, see instructions at bottom of table.

Inches Over All	Thickness, B. W. G. and Inches																		
	No. 13	No. 12	No. 11	No. 10	No. 9	No. 8	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
3/8	.117	.133	.146	.162	.177	.196	.151	.221	.287	.348	.406										
7/16	.137	.156	.171	.190	.209	.232	.178	.261	.340	.415	.486	.553									
1/2	.157	.179	.197	.219	.240	.267	.204	.301	.393	.481	.566	.646	.722								
9/16	.177	.202	.222	.247	.272	.302	.231	.341	.446	.548	.645	.739	.828	.900							
5/8	.197	.226	.248	.276	.303	.337	.258	.380	.499	.614	.725	.832	.935	1.020	1.128						
11/16	.217	.249	.273	.304	.335	.372	.284	.420	.552	.680	.805	.925	1.041	1.139	1.261	1.383					
3/4	.238	.272	.299	.333	.366	.407	.311	.460	.605	.747	.884	1.018	1.147	1.259	1.394	1.529	1.665				
13/16	.258	.295	.324	.361	.398	.442	.337	.500	.659	.813	.964	1.111	1.253	1.378	1.527	1.675	1.824	1.928			
7/8	.278	.318	.350	.389	.429	.477	.364	.540	.712	.880	1.044	1.204	1.360	1.498	1.659	1.821	1.984	2.100	2.258		
15/16	.298	.341	.375	.418	.461	.512	.390	.580	.765	.946	1.123	1.297	1.466	1.617	1.792	1.968	2.143	2.273	2.444	2.615	
1	.318	.365	.401	.446	.492	.547	.417	.620	.818	1.013	1.203	1.390	1.572	1.737	1.925	2.114	2.302	2.446	2.630	2.814	2.998
1 1/16	.339	.388	.426	.475	.523	.582	.444	.659	.871	1.079	1.283	1.483	1.678	1.856	2.058	2.260	2.462	2.618	2.816	3.013	3.211
1 1/8	.359	.411	.452	.503	.555	.617	.470	.699	.924	1.145	1.362	1.575	1.785	1.976	2.191	2.406	2.621	2.791	3.002	3.212	3.432
1 3/16	.379	.434	.477	.532	.586	.652	.497	.739	.977	1.212	1.442	1.668	1.891	2.096	2.324	2.552	2.781	2.964	3.188	3.412	3.636
1 1/4	.399	.457	.503	.560	.618	.687	.523	.779	1.030	1.278	1.522	1.761	1.997	2.215	2.456	2.698	2.940	3.136	3.373	3.611	3.848
1 5/16	.419	.480	.528	.589	.649	.722	.550	.819	1.084	1.345	1.601	1.854	2.103	2.335	2.589	2.844	3.099	3.309	3.559	3.810	4.061
1 3/8	.440	.503	.554	.617	.681	.757	.576	.859	1.137	1.411	1.681	1.947	2.210	2.454	2.722	2.990	3.259	3.482	3.745	4.009	4.273
1 7/16	.460	.527	.579	.646	.712	.793	.603	.898	1.190	1.477	1.761	2.040	2.316	2.574	2.855	3.136	3.418	3.654	3.931	4.209	4.486
1 1/2	.480	.550	.605	.674	.744	.828	.629	.938	1.243	1.544	1.841	2.133	2.422	2.693	2.988	3.282	3.577	3.827	4.117	4.608	4.698
1 9/16	.500	.573	.630	.703	.775	.863	.656	.978	1.296	1.610	1.920	2.226	2.528	2.813	3.120	3.428	3.737	4.000	4.303	4.607	4.911
1 5/8	.520	.596	.656	.731	.806	.898	.683	1.018	1.349	1.677	2.000	2.319	2.635	2.932	3.253	3.575	3.896	4.172	4.489	4.806	5.123
1 11/16	.540	.619	.681	.760	.838	.933	.709	1.058	1.402	1.743	2.080	2.412	2.741	3.052	3.386	3.721	4.056	4.345	4.675	5.005	5.336
1 3/4	.561	.642	.707	.788	.869	.968	.736	1.098	1.455	1.809	2.159	2.505	2.847	3.171	3.519	3.867	4.215	4.518	4.861	5.205	5.548
1 13/16	.581	.666	.732	.817	.901	1.003	.762	1.137	1.509	1.876	2.239	2.598	2.953	3.291	3.652	4.013	4.374	4.690	5.047	5.404	5.761
1 7/8	.601	.689	.758	.845	.932	1.038	.789	1.177	1.562	1.942	2.319	2.691	3.060	3.410	3.784	4.159	4.534	4.833	5.233	5.603	5.973
1 15/16	.621	.712	.783	.874	.964	1.073	.815	1.217	1.615	2.009	2.398	2.784	3.166	3.530	3.917	4.305	4.693	5.036	5.419	5.802	6.186
2	.641	.735	.809	.902	.995	1.108	.842	1.257	1.668	2.075	2.478	2.877	3.272	3.649	4.050	4.451	4.852	5.208	5.605	6.002	6.398
2 1/16	.662	.758	.834	.930	1.027	1.143	.869	1.297	1.721	2.141	2.558	2.970	3.378	3.769	4.183	4.597	5.012	5.381	5.791	6.201	6.611
2 1/8	.682	.781	.860	.959	1.058	1.178	.895	1.337	1.774	2.208	2.637	3.063	3.485	3.888	4.316	4.743	5.171	5.554	5.977	6.400	6.823
2 3/16	.702	.805	.885	.987	1.090	1.213	.922	1.377	1.827	2.274	2.717	3.156	3.591	4.008	4.449	4.889	5.331	5.726	6.163	6.599	7.036
2 1/4	.722	.828	.911	1.016	1.121	1.248	.948	1.416	1.880	2.341	2.797	3.249	3.697	4.128	4.581	5.035	5.490	5.899	6.348	6.798	7.248
2 5/16	.742	.851	.936	1.044	1.152	1.283	.975	1.456	1.934	2.407	2.876	3.342	3.803	4.247	4.714	5.182	5.649	6.072	6.534	6.998	7.461
2 3/8	.763	.874	.962	1.073	1.184	1.318	1.001	1.496	1.987	2.473	2.956	3.435	3.910	4.367	4.847	5.328	5.809	6.244	6.720	7.197	7.673
2 7/16	.783	.897	.987	1.101	1.215	1.354	1.028	1.536	2.040	2.540	3.036	3.528	4.016	4.486	4.980	5.474	5.968	6.417	6.906	7.396	7.886
2 1/2	.803	.920	1.013	1.130	1.247	1.389	1.054	1.576	2.093	2.606	3.116	3.621	4.122	4.606	5.113	5.620	6.127	6.590	7.092	7.595	8.098

WEIGHTS OF ROUND EDGE FLATS—CONTINUED

Inches Over All	Thickness, B. W. G. and Inches																				
	No. 13	No. 12	No. 11	No. 10	No. 9	No. 8	1/8	5/32	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
2 5/8	.843	.967	1.064	1.187	1.310	1.459	1.108	1.655	2.199	2.739	3.275	3.807	4.335	4.845	5.378	5.912	6.446	6.935	7.464	7.994	8.523
2 3/4	.884	1.013	1.115	1.244	1.373	1.529	1.161	1.735	2.305	2.872	3.434	3.993	4.547	5.084	5.644	6.204	6.765	7.280	7.836	8.392	8.948
2 7/8	.924	1.059	1.166	1.301	1.435	1.599	1.214	1.815	2.412	3.004	3.594	4.179	4.760	5.323	5.909	6.496	7.084	7.625	8.208	8.791	9.373
3	.964	1.106	1.217	1.358	1.498	1.669	1.267	1.895	2.518	3.138	3.753	4.365	4.972	5.562	6.175	6.789	7.402	7.971	8.580	9.189	9.798
3 1/8				1.415	1.561	1.739	1.320	1.974	2.624	3.270	3.912	4.551	5.185	5.801	6.441	7.081	7.721	8.316	8.952	9.587	10.223
3 1/4				1.472	1.624	1.809	1.373	2.054	2.730	3.403	4.072	4.736	5.397	6.040	6.706	7.373	8.040	8.661	9.323	9.986	10.648
3 3/8				1.528	1.687	1.879	1.426	2.134	2.837	3.536	4.231	4.922	5.610	6.279	6.972	7.665	8.359	9.007	9.695	10.384	11.073
3 1/2				1.585	1.750	1.950	1.479	2.213	2.943	3.669	4.391	5.108	5.822	6.518	7.238	7.957	8.677	9.352	10.067	10.783	11.498
3 5/8								2.293	3.049	3.802	4.550	5.294	6.035	6.757	7.503	8.250	8.996	9.697	10.439	11 181	11.923
3 3/4								2.373	3.155	3.934	4.709	5.480	6.247	6.996	7.769	8.542	9.315	10.043	10.811	11.580	12.348
3 7/8								2.452	3.262	4.067	4.869	5.666	6.460	7.235	8.034	8.834	9.634	10.388	11.183	11.978	12.773
4								2.532	3.368	4.200	5.028	5.852	6.672	7.474	8.300	9.126	9.952	10.733	11.555	12.377	13.198
4 1/8									3.474	4.333	5.187	6.038	6.885	7.713	8.566	9.418	10.271	11.079	11.927	12.775	13.623
4 1/4									3.580	4.466	5.347	6.224	7.097	7.953	8.831	9.710	10.590	11.424	12.298	13.173	14.048
4 3/8									3.687	4.598	5.506	6.410	7.310	8.192	9.097	10.003	10.909	11.769	12.670	13.572	14.473
4 1/2									3.793	4.731	5.666	6.596	7.522	8.431	9.363	10.295	11.227	12.115	13.042	13.970	14.898
4 5/8									3.899	4.864	5.825	6.782	7.735	8.670	9.628	10.587	11.546	12.460	13.414	14.369	15.323
4 3/4									4.005	4.997	5.984	6.968	7.947	8.909	9.894	10.879	11.865	12.805	13.786	14.767	15.748
4 7/8									4.112	5.130	6.144	7.154	8.160	9.148	10.159	11.171	12.184	13.150	14.158	15.166	16.173
5									4.218	5.263	6.303	7.340	8.372	9.387	10.425	11.464	12.502	13.496	14.530	15.564	16.598
5 1/8									4.324	5.395	6.462	7.525	8.585	9.626	10.691	11.756	12.821	13.841	14.902	15.962	17.023
5 1/4									4.430	5.528	6.622	7.711	8.797	9.865	10.956	12.048	13.140	14.186	15.273	16.361	17.448
5 3/8									4.537	5.661	6.781	7.897	9.010	10.104	11.222	12.340	13.459	14.532	15.645	16.759	17.873
5 1/2									4.643	5.794	6.941	8.083	9.222	10.343	11.488	12.632	13.777	14.877	16.017	17.158	18.298
5 5/8									4.749	5.927	7.100	8.269	9.435	10.582	11.753	12.925	14.096	15.222	16.389	17.556	18.723
5 3/4									4.855	6.059	7.259	8.455	9.647	10.821	12.019	13.217	14.415	15.568	16.761	17.955	19.148
5 7/8									4.962	6.192	7.419	8.641	9.860	11.060	12.284	13.509	14.734	15.913	17.133	18.353	19.573
6									5.068	6.325	7.578	8.827	10.072	11.299	12.550	13.801	15.052	16.258	17.505	18.752	19.998

To obtain face measure for any thickness, subtract from over-all measure the increment given in table below for corresponding thickness.

Thickness, B. W. G. and Inches																					
No. 13	No. 12	No. 11	No. 10	No. 9	No. 8	1/8	5/32	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
Increment, Inches																					
.0475	.0545	.0600	.0670	.0740	.0825	1/16	3/32	1/8	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	13/32	7/16	15/32	1/2

WEIGHTS OF ROUND BARS

POUNDS PER LINEAL FOOT

Size, Inches	Pounds per Foot	Size, Inches	Pounds per Foot	Size, Inches	Pounds per Foot	Size, Inches	Pounds per Foot
1/8	.0417						
1/16	.0528	1 1/16	2.8399	2 1/16	20.656	5 1/16	82.62
3/32	.0652	1 1/8	3.0146	2 1/8	21.123	5 1/8	84.49
1/8	.0789	1 3/16	3.1945	2 3/16	21.595	5 3/16	86.38
5/32	.0939	1 1/4	3.3797	2 1/4	22.072	5 1/4	88.29
3/16	.1102	1 5/16	3.5700	2 5/16	22.555	5 5/16	90.22
7/32	.1278	1 3/8	3.7656	2 3/8	23.042	5 3/8	92.17
1/4	.1467	1 7/16	3.9664	2 7/16	23.535	5 7/16	94.14
9/32	.1669	1 1/2	4.1724	3	24.033	6	96.13
5/16	.1884	1 9/16	4.3836	3 1/16	24.547	6 1/16	98.15
11/32	.2112	1 5/8	4.6001	3 1/8	25.045	6 1/8	100.18
3/8	.2354	1 11/16	4.8218	3 3/16	25.589	6 3/16	102.24
13/32	.2606	1 3/4	5.0486	3 1/4	26.078	6 1/4	104.31
7/16	.2875	1 13/16	5.2807	3 5/16	26.602	6 5/16	106.41
15/32	.3155	1 7/8	5.5180	3 3/8	27.131	6 3/8	108.53
1/2	.3449	1 15/16	5.7606	3 7/16	27.666	6 7/16	110.66
17/32	.3755	2	6.0083	3 1/2	28.206	6 1/2	112.82
9/16	.4075	2 1/16	6.2613	3 9/16	28.751	6 9/16	115.00
19/32	.4407	2 1/8	6.5194	3 5/8	29.301	6 5/8	117.20
5/8	.4753	2 3/16	6.7828	3 11/16	29.856	6 11/16	119.43
21/32	.5111	2 1/4	7.0514	3 3/4	30.417	6 3/4	121.67
11/16	.5483	2 5/16	7.3252	3 13/16	30.983	6 13/16	123.93
23/32	.5867	2 3/8	7.6043	3 7/8	31.554	6 7/8	126.22
3/4	.6265	2 7/16	7.8885	3 15/16	32.130	6 15/16	128.52
25/32	.6676	2 1/2	8.1780	3 1/2	32.712	7	130.85
13/16	.7100	2 9/16	8.4727	3 9/16	33.891	7 1/16	133.19
27/32	.7536	2 5/8	8.7725	3 5/8	35.090	7 1/8	135.56
7/8	.7986	2 11/16	9.0777	3 11/16	36.311	7 3/16	137.95
29/32	.8449	2 3/4	9.3880	3 3/4	37.552	7 1/4	140.36
15/16	.8925	2 13/16	9.7085	3 13/16	38.814	7 5/16	142.79
31/32	.9414	2 7/8	10.0243	3 7/8	40.097	7 3/8	145.24
1	.9916	2 15/16	10.3503	3 15/16	41.401	7 7/16	147.71
1 1/16	1.0431	2	10.6814	4	42.726	7 1/2	150.21
1 1/16	1.0959	2 1/16	11.0178	4 1/16	44.071	7 9/16	152.72
1 1/8	1.1500	2 1/8	11.3595	4 1/8	45.438	7 5/8	155.26
1 3/16	1.2054	2 3/16	11.7063	4 3/16	46.825	7 11/16	157.81
1 1/4	1.2622	2 1/4	12.0583	4 1/4	48.233	7 3/4	160.39
1 5/16	1.3202	2 5/16	12.4156	4 5/16	49.662	7 13/16	162.99
1 3/8	1.3795	2 3/8	12.7781	4 3/8	51.112	7 7/8	165.60
1 7/16	1.4401	2 7/16	13.1458	4 7/16	52.583	7 15/16	168.24
1 1/2	1.5021	2 1/2	13.5187	4 1/2	54.075	8	170.90
1 9/16	1.5653	2 9/16	13.8968	4 9/16	55.587	8 1/16	173.58
1 5/8	1.6299	2 5/8	14.2802	4 5/8	57.121	8 1/8	176.29
1 11/16	1.6957	2 11/16	14.6687	4 11/16	58.675	8 3/16	179.01
1 3/4	1.7629	2 3/4	15.0625	4 3/4	60.250	8 1/4	181.75
1 13/16	1.8313	2 13/16	15.4615	4 13/16	61.846	8 5/16	184.52
1 7/8	1.9011	2 7/8	15.8657	4 7/8	63.473	8 3/8	187.30
1 15/16	1.9721	2 15/16	16.2751	4 15/16	65.100	8 7/16	190.11
2	2.0445	2 1/2	16.6898	5	66.759	8 1/2	192.93
2 1/16	2.1182	2 9/16	17.1096	5 1/16	68.438	8 9/16	195.78
2 1/8	2.1931	2 5/8	17.5347	5 1/8	70.139	8 5/8	198.65
2 3/16	2.2694	2 11/16	17.9650	5 3/16	71.860	8 11/16	201.54
2 1/4	2.3470	2 3/4	18.4004	5 1/4	73.602	8 3/4	204.45
2 5/16	2.4259	2 13/16	18.8412	5 5/16	75.365	8 13/16	207.38
2 3/8	2.5061	2 7/8	19.2871	5 3/8	77.148	8 7/8	210.33
2 7/16	2.5876	2 15/16	19.7382	5 7/16	78.953	8 15/16	213.31
2	2.6704	3	20.1946	5 1/2	80.778	9	216.30

WEIGHTS OF SQUARE BARS

POUNDS PER LINEAL FOOT

Size, Inches	Pounds per Foot	Size, Inches	Pounds per Foot	Size, Inches	Pounds per Foot	Size, Inches	Pounds per Foot
1/8	.0531						
9/64	.0672	1 1/32	3.616	2 3/32	26.300	5 1/16	105.20
5/32	.0830	1 1/16	3.838	2 1/16	26.895	5 5/32	107.58
11/64	.1004	1 3/32	4.067	2 1/32	27.496	5 1/8	109.98
3/16	.1195	1 1/8	4.303	2 1/8	28.103	5 1/4	112.41
13/64	.1403	1 5/32	4.546	2 3/32	28.717	5 1/32	114.87
7/32	.1627	1 3/16	4.795	2 1/16	29.338	5 5/32	117.35
15/64	.1868	1 7/32	5.050	2 1/32	29.966	5 1/8	119.86
1/4	.2125	1 1/4	5.313	3	30.600	6	122.40
17/64	.2399	1 9/32	5.581	3 1/32	31.241	6 1/16	124.96
9/32	.2689	1 5/16	5.857	3 1/16	31.888	6 1/8	127.55
19/64	.2997	1 11/32	6.139	3 3/32	32.542	6 3/16	130.17
5/16	.3320	1 3/8	6.428	3 1/8	33.203	6 1/4	132.81
21/64	.3661	1 13/32	6.724	3 5/32	33.871	6 5/16	135.48
11/32	.4018	1 7/16	7.026	3 3/16	34.545	6 3/8	138.18
23/64	.4391	1 15/32	7.335	3 7/32	35.225	6 7/16	140.90
3/8	.4781	1 1/2	7.650	3 1/4	35.913	6 1/2	143.65
25/64	.5188	1 17/32	7.972	3 9/32	36.606	6 9/16	146.43
13/32	.5611	1 9/16	8.301	3 5/16	37.307	6 5/8	149.23
27/64	.6051	1 19/32	8.636	3 11/32	38.014	6 11/16	152.06
7/16	.6508	1 5/8	8.978	3 3/8	38.728	6 3/4	154.81
29/64	.6981	1 21/32	9.327	3 13/32	39.449	6 13/16	157.79
15/32	.7471	1 11/16	9.682	3 7/16	40.176	6 7/8	160.70
31/64	.7977	1 23/32	10.044	3 15/32	40.910	6 15/16	163.64
1/2	.8500	1 3/4	10.413	3 1/2	41.650	7	166.60
33/64	.9040	1 25/32	10.788	3 9/32	43.151	7 1/16	169.59
17/32	.9596	1 13/16	11.170	3 5/8	44.678	7 1/8	172.60
35/64	1.0168	1 27/32	11.558	3 11/32	46.232	7 3/16	175.64
9/16	1.0758	1 7/8	11.953	3 3/4	47.813	7 1/4	178.71
37/64	1.1364	1 29/32	12.355	3 13/32	49.420	7 5/16	181.81
19/32	1.1986	1 15/16	12.763	3 7/8	51.053	7 3/8	184.93
39/64	1.2625	1 31/32	13.178	3 15/32	52.713	7 7/16	188.08
5/8	1.3281	2	13.600	4	54.400	7 1/2	191.25
41/64	1.3954	2 1/32	14.028	4 1/16	56.113	7 9/16	194.45
21/32	1.4643	2 1/16	14.463	4 1/8	57.853	7 5/8	197.68
43/64	1.5348	2 3/32	14.905	4 3/16	59.620	7 11/16	200.93
11/16	1.6070	2 1/8	15.353	4 1/4	61.413	7 3/4	204.21
45/64	1.6809	2 5/32	15.808	4 5/16	63.232	7 13/16	207.52
23/32	1.7564	2 3/16	16.270	4 3/8	65.078	7 7/8	210.85
47/64	1.8336	2 7/32	16.738	4 7/16	66.951	7 15/16	214.21
3/4	1.9125	2 1/4	17.213	4 1/2	68.850	8	217.60
49/64	1.9930	2 9/32	17.694	4 9/16	70.776	8 1/16	221.01
25/32	2.0752	2 5/16	18.182	4 5/8	72.728	8 1/8	224.45
51/64	2.1590	2 11/32	18.677	4 11/16	74.707	8 3/16	227.92
13/16	2.2445	2 3/8	19.178	4 3/4	76.713	8 1/4	231.41
53/64	2.3317	2 13/32	19.686	4 13/16	78.745	8 5/16	234.93
27/32	2.4205	2 7/16	20.201	4 7/8	80.803	8 3/8	238.48
55/64	2.5110	2 15/32	20.722	4 15/16	82.888	8 7/16	242.01
7/8	2.6031	2 1/2	21.250	5	85.000	8 1/2	245.65
57/64	2.6969	2 17/32	21.785	5 1/16	87.138	8 9/16	249.28
29/32	2.7924	2 9/16	22.326	5 1/8	89.303	8 5/8	252.93
59/64	2.8895	2 19/32	22.874	5 3/16	91.495	8 11/16	256.61
15/16	2.9883	2 5/8	23.428	5 1/4	93.713	8 3/4	260.31
61/64	3.0887	2 21/32	23.989	5 5/16	95.957	8 13/16	264.04
31/32	3.1908	2 11/16	24.557	5 3/8	98.228	8 7/8	267.80
63/64	3.2946	2 23/32	25.131	5 7/16	100.526	8 15/16	271.59
1	3.4000	2 3/4	25.713	5 1/2	102.850	9	275.40

WEIGHTS OF OVALS
POUNDS PER LINEAL FOOT

Width, Inches	Thickness, Inches																							
	3/32	1/8	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	13/32	7/16	15/32	1/2	17/32	9/16	19/32	5/8	21/32	11/16	23/32	3/4	13/16	7/8
3/8	.081	.109	.137	.167	.198	.230	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
13/32	.087	.117	.148	.180	.213	.247	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
7/16	.094	.126	.159	.193	.228	.264	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
15/32	.101	.135	.170	.206	.243	.280	.319	.359	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
1/2	.107	.143	.180	.218	.257	.297	.338	.380	.424	.470	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
17/32	....	.152	.191	.231	.272	.314	.357	.401	.447	.494	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
9/16	....	.161	.202	.244	.287	.331	.376	.422	.470	.519	.569	.621	....	....	....	....	....	....	....	....	....	....	....	....	....
19/32	....	.170	.213	.257	.302	.348	.395	.443	.492	.543	.595	.648	....	....	....	....	....	....	....	....	....	....	....	....	....
5/8	....	.179	.224	.270	.317	.365	.414	.464	.515	.568	.622	.677	.734	.792	....	....	....	....	....	....	....	....	....	....	....
11/16	....	....	.250	.298	.348	.399	.453	.507	.562	.618	.675	.724	.795	.857	....	....	....	....	....	....	....	....	....	....	....
3/4	....	....	.268	.319	.371	.435	.492	.550	.608	.668	.729	.792	.756	.921	.988	1.056	....	....	....	....	....	....	....	....	....
13/16	....	....	....	.349	.409	.469	.530	.593	.655	.719	.784	.851	.918	.987	1.058	1.130	....	....	....	....	....	....	....	....	....
7/8	....	....	....	....	....	.504	.569	.635	.702	.770	.839	.909	.981	1.054	1.128	1.203	1.280	1.358	....	....	....	....	....	....	....
15/16	....	....	....	....	....	.539	.608	.679	.750	.822	.895	.969	1.044	1.121	1.199	1.278	1.358	1.440	....	....	....	....	....	....	....
1	....	....	....	....	....	.574	.648	.722	.797	.873	.950	1.029	1.108	1.188	1.270	1.353	1.437	1.522	1.608	1.697	1.787	1.878	....	....	....
1 1/8	....	....	....	....	....	....	....	....	....	.977	1.062	1.149	1.236	1.324	1.413	1.504	1.596	1.688	1.782	1.878	1.975	2.073	2.275	2.482
1 1/4	....	....	....	....	....	....	....	....	....	1.082	1.176	1.270	1.365	1.461	1.558	1.657	1.756	1.857	1.958	2.061	2.165	2.271	2.486	2.708

WEIGHTS OF BLUNT OVALS
POUNDS PER LINEAL FOOT

Width, Inches	Thickness, Inches						
	1/8	5/32	3/16	7/32	1/4	9/32	5/16
3/8	.125	.156	.188	....	....	....	....
7/16	.146	.182	.219	.256	....	....	....
1/2	.167	.208	.250	.292	.334	.376	.418
9/16	.188	.235	.282	.329	.376	.423	.461
5/8	.209	.260	.313	.365	.417	.469	.521

WEIGHTS OF HEXAGON BARS
POUNDS PER LINEAL FOOT

Size	Weight	Size	Weight	Size	Weight	Size	Weight	Size	Weight	Size	Weight	Size	Weight	Size	Weight
1/8	.046	3/8	.414	5/8	1.150	7/8	2.254	1 1/4	4.601	1 3/4	9.018	2 3/4	16.609	3 1/4	31.101
5/32	.072	7/16	.486	11/16	1.268	15/16	2.418	1 5/16	5.072	1 13/16	9.673	2 13/16	18.403	3 5/16	33.540
3/16	.103	1/2	.564	3/4	1.392	1	2.588	1 3/8	5.567	1 7/8	10.352	2 7/8	20.289	3 3/8	36.070
7/32	.141	9/16	.647	13/16	1.521	1 1/16	2.763	1 7/16	6.085	1 15/16	11.053	2 15/16	22.268	3 7/16	38.692
1/4	.184	5/8	.736	7/8	1.656	1 1/8	2.944	1 1/2	6.625	2	11.778	3	24.338	3 1/2	41.407
9/32	.233	11/16	.831	15/16	1.797	1 3/16	3.324	1 9/16	7.189	2 1/16	13.296	3 1/16	26.500	3 9/16	44.213
5/16	.287	3/4	.932	1	1.944	1 1/4	3.727	1 5/8	7.775	2 1/4	14.907	3 1/8	28.755	4	47.112
11/32	.348	13/16	1.038	1 1/16	2.096	1 5/16	4.152	1 11/16	8.385						

WEIGHTS OF HALF OVALS
POUNDS PER LINEAL FOOT

Width, Inches	Thickness, B. W. G. and Inches													
	No. 15	No. 14	No. 13	No. 12	3/32	1/8	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8
3/8	.063	.073	.085	.099	.084	.115	.150							
7/16	.073	.085	.098	.113	.096	.132	.170	.211						
1/2	.....	.096	.111	.128	.109	.149	.191	.235	.283					
9/16	.....	.108	.124	.143	.122	.166	.211	.259	.310	.365				
5/8	.....	.119	.137	.158	.135	.183	.232	.284	.339	.396	.457			
11/16	.....	.131	.150	.173	.148	.200	.254	.309	.367	.428	.492			
3/4	.....	.143	.164	.188	.161	.217	.275	.334	.396	.460	.527	.599		
13/16	.....	.....	.....	.204	.174	.235	.297	.359	.425	.494	.564	.639		
7/8	.....	.....	.....	.219	.188	.252	.318	.385	.455	.527	.602	.679	.760	.844
15/16	.....	.....	.....	.234	.201	.269	.339	.411	.485	.560	.638	.720	.804	.891
1	.....	.....	.....	.249	.214	.287	.361	.437	.514	.594	.676	.761	.848	.939
1 1/16	.....	.....	.....	.....	.....	.322	.405	.489	.574	.662	.752	.843	.938	1.037
1 1/8	.....	.....	.....	.....	.....	.357	.448	.541	.635	.731	.828	.928	1.030	1.136
1 3/16	.....	.....	.....	.....	.....	.392	.492	.593	.696	.800	.906	1.013	1.123	1.236

Width, Inches	Thickness, Inches															
	1/8	3/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	13/32	7/16	15/32	1/2	17/32	9/16	5/8	11/16	3/4
1 1/2	.427	.536	.645	.756	.869	.983	1.099	1.217	1.337	1.459	1.584	1.711	1.843	.....	.....	.....	.....	.....
1 5/8	.....	.....	.698	.817	.938	1.061	1.185	1.311	1.439	1.569	1.701	1.836	1.974	.....	.....	.....	.....	.....
1 3/4	.....	.....	.....	.....	1.008	1.138	1.271	1.405	1.541	1.679	1.819	1.962	2.108	.....	.....	.....	.....	.....
1 7/8	.....	.....	.....	.....	1.077	1.216	1.357	1.500	1.644	1.790	1.938	2.088	2.242	2.398	2.555	.....	.....	.....
2	.....	.....	.....	.....	1.147	1.295	1.444	1.595	1.747	1.901	2.058	2.216	2.376	2.539	2.705	3.043	.....	.....
2 1/4	.....	.....	.....	.....	1.288	1.452	1.618	1.786	1.955	2.125	2.297	2.471	2.648	2.827	3.007	3.377	3.755	4.147
2 1/2	.....	.....	.....	.....	1.428	1.610	1.793	1.977	2.163	2.350	2.539	2.730	2.922	3.116	3.313	3.713	4.122	4.542
2 3/4	.....	.....	.....	.....	.....	.....	1.968	2.160	2.371	2.575	2.781	2.989	3.198	3.409	3.621	4.053	4.492	4.943
3	.....	.....	.....	.....	.....	.....	2.144	2.363	2.582	2.803	3.025	3.249	3.475	3.702	3.930	4.394	4.866	5.347
3 1/4	.....	.....	.....	.....	.....	.....	2.319	2.555	2.792	3.030	3.269	3.510	3.752	3.996	4.242	4.738	5.241	5.754
3 1/2	.....	.....	.....	.....	.....	.....	2.495	2.748	3.002	3.257	3.514	3.772	4.031	4.292	4.553	5.083	5.618	6.164
3 3/4	.....	.....	.....	.....	.....	.....	2.671	2.941	3.213	3.486	3.759	4.034	4.310	4.587	4.866	5.429	5.997	6.574
4	.....	.....	.....	.....	.....	.....	.....	.....	3.424	3.714	4.005	4.296	4.589	4.881	5.180	5.776	6.379	6.987

Weights of Half Rounds: Use one half weight of Rounds shown on page 908.

CHICAGO—JOSEPH T. RYERSON & SON—NEW YORK

MACHINE BOLTS

APPROXIMATE WEIGHT IN POUNDS OF 100 BOLTS OF SIZES ENUMERATED BELOW

Length, Inches	¼	5/16	⅜	7/16	½	9/16	⅝	¾	⅞	1	1⅛	1¼
1½	3.7	6.0	9.0	15.2	19.6	27.5	34.3	54.3	.....	.....	.....	.....
2	4.2	7.0	10.5	17.2	22.2	31.0	38.4	60.0	90.8	.....	.....	.....
2½	4.8	8.0	12.0	19.2	24.8	34.5	42.5	65.7	99.1	148.2	209.0	277.0
3	5.5	9.0	13.5	21.2	27.5	38.0	46.7	71.4	107.4	159.0	222.5	293.5
3½	6.1	10.0	15.0	23.2	30.1	41.5	50.8	77.1	115.7	169.8	236.0	310.0
4	6.8	11.0	16.5	25.2	32.8	45.0	55.0	82.8	124.0	180.6	249.5	326.5
4½	7.4	12.0	18.0	27.2	35.4	48.5	59.1	88.9	132.3	191.4	263.0	343.0
5	8.1	13.0	19.5	29.2	38.1	52.0	63.3	95.0	140.6	202.2	276.5	359.5
5½	8.7	14.0	21.0	31.2	40.7	55.5	67.4	101.1	148.9	213.0	290.0	376.0
6	9.4	15.0	22.5	33.2	43.4	59.0	71.6	107.2	157.2	223.8	303.5	392.5
6½	10.1	16.0	24.1	35.2	46.0	62.5	75.7	113.3	165.5	234.6	317.0	409.0
7	10.8	17.0	25.7	37.2	48.7	66.0	79.9	119.4	173.8	245.4	330.5	425.5
7½	11.5	18.0	27.3	39.2	51.3	69.5	84.0	125.5	182.1	256.2	344.0	442.0
8	12.2	19.0	28.9	41.2	54.0	73.0	88.2	131.6	190.4	267.0	357.5	458.5
9	....	....	32.1	45.2	59.5	80.0	96.5	143.8	207.0	288.6	385.5	493.0
10	....	....	35.3	49.2	65.0	87.0	104.8	156.0	223.6	310.2	413.5	527.5
11	....	....	38.5	53.2	70.5	94.0	113.1	168.2	240.2	331.8	441.5	562.0
12	....	....	41.7	57.2	76.0	101.0	121.4	180.4	256.8	353.4	469.5	596.5
13	....	....	....	....	81.5	108.0	129.7	192.6	273.4	375.0	497.5	631.0
14	....	....	....	....	87.0	115.0	138.0	204.8	290.0	396.6	525.5	665.5
15	....	....	....	....	92.5	122.0	146.3	217.0	306.6	418.2	553.5	700.0
16	....	....	....	....	98.0	129.0	154.6	229.2	323.2	439.8	581.5	734.5
17	....	....	....	....	103.5	136.0	162.9	241.4	339.8	461.4	609.5	769.0
18	....	....	....	....	109.0	143.0	171.2	253.6	356.4	483.0	637.5	803.5
19	....	....	....	....	114.5	150.0	179.5	265.8	373.0	504.6	665.5	838.0
20	....	....	....	....	120.0	157.0	187.8	278.0	389.6	526.2	693.5	872.5
21	....	....	....	....	.....	.....	.....	290.4	406.5	548.2	721.5	907.0
22	....	....	....	....	.....	.....	.....	302.8	423.4	570.2	749.5	941.5
23	....	....	....	....	.....	.....	.....	315.2	440.3	592.2	777.5	976.0
24	....	....	....	....	.....	.....	.....	327.6	457.2	614.2	805.5	1010.5
25	....	....	....	....	.....	.....	.....	340.0	474.1	636.2	833.5	1045.0
26	....	....	....	....	.....	.....	.....	352.4	491.0	658.2	861.5	1079.5
27	....	....	....	....	.....	.....	.....	364.8	507.9	680.2	889.5	1114.0
28	....	....	....	....	.....	.....	.....	377.2	524.8	702.2	917.5	1148.5
29	....	....	....	....	.....	.....	.....	389.6	541.7	724.2	945.5	1183.0
30	....	....	....	....	.....	.....	.....	402.0	558.6	746.2	973.5	1217.5

U. S. STANDARD HOT PRESSED NUTS

Size of Bolt, Inches	Number in 200 Pounds				Weight of One Nut			
	Square		Hexagon		Square		Hexagon	
	Blank	Tapped	Blank	Tapped	Blank	Tapped	Blank	Tapped
1/4	13800	14760	17400	18600	.014	.013	.012	.011
5/16	7400	9915	9200	9760	.027	.025	.022	.020
3/8	5000	5320	6000	6400	.04	.037	.033	.031
7/16	3200	3400	4000	4250	.062	.059	.05	.047
1/2	2400	2540	3000	3200	.083	.079	.067	.063
9/16	1600	1690	2128	2275	.125	.12	.094	.088
5/8	1360	1440	1540	1630	.147	.14	.130	.123
3/4	832	880	998	1050	.24	.227	.200	.190
7/8	544	578	628	665	.37	.346	.32	.30
1	376	397	436	460	.53	.504	.46	.435
1 1/8	268	284	288	305	.75	.70	.695	.655
1 1/4	206	220	250	260	.97	.90	.80	.77
1 3/8	146	157	182	190	1.37	1.27	1.10	1.06
1 1/2	120	127	144	150	1.67	1.57	1.39	1.33
1 5/8	95	100	116	120	2.10	2.00	1.72	1.67
1 3/4	74	77	95	100	2.70	2.60	2.14	2.00
1 7/8	64	67	80	84	3.12	3.00	2.50	2.39
2	53	56	62	65	3.77	3.57	3.23	3.08
2 1/8	43	45	52	54	4.65	4.40	3.85	3.74
2 1/4	36	37	44	46	5.55	5.40	4.55	4.35
2 3/8	28	29	35	36	7.14	6.89	5.72	5.56
2 1/2	24	25	32	33	8.33	8.00	6.25	6.06
2 3/4	21	22	27	27	9.52	9.09	7.41	7.41
3	16	17	18	18	12.50	11.80	11.11	11.11

COACH AND LAG SCREWS

APPROXIMATE WEIGHT IN POUNDS OF 100 SCREWS

Length	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
1 1/2	2.7	3.5	5.8	9.1	.....	.....	.....	.....	.....	.....
2	3.5	4.4	7.1	11.0	15.0	22.8	26.3	.....	.....	.....
2 1/2	4.2	5.3	8.5	12.9	17.3	25.3	29.9	.....	.....	.....
3	4.7	6.2	9.8	14.8	19.5	27.8	33.5	46.1	71.8	103.0
3 1/2	5.2	7.1	11.1	16.5	21.6	30.4	37.1	51.5	78.5	112.0
4	5.7	8.0	12.5	18.2	23.8	33.0	40.7	57.1	85.3	121.0
4 1/2	6.5	9.0	13.8	19.9	26.3	35.5	44.5	62.9	92.0	130.0
5	7.0	10.0	14.9	21.8	28.8	38.0	48.3	68.8	98.6	141.0
5 1/2	7.5	11.0	16.0	23.5	31.3	40.7	52.0	74.7	105.3	153.0
6	8.0	12.0	17.2	25.2	33.8	43.3	55.7	80.5	112.0	164.0
7	.....	.....	.....	.....	38.9	50.0	63.2	92.3	125.4	185.0
8	.....	.....	.....	.....	44.0	56.8	69.3	104.0	138.8	205.0
9	.....	.....	.....	.....	48.5	63.5	76.4	115.4	156.3	225.0
10	.....	.....	.....	.....	53.0	70.3	83.5	126.8	173.8	245.0
11	.....	.....	.....	.....	57.5	77.0	90.6	138.2	191.3	265.0
12	.....	.....	.....	.....	62.0	83.7	97.8	149.5	208.8	285.0

WEIGHTS OF ROUND HEAD RIVETS OR ROUND HEAD BOLTS WITHOUT NUTS PER 100

STEEL

Length, Inches	½ Inch Diameter	⅝ Inch Diameter	¾ Inch Diameter	⅞ Inch Diameter	1 Inch Diameter	1⅛ Inch Diameter	1¼ Inch Diameter
1¼	5.5	12.8	22.0	29.3	43.9	66.6	93.3	127.
1½	6.3	14.2	24.1	32.4	48.2	72.1	100.	136.
1¾	7.0	15.5	26.3	35.5	52.5	77.7	107.	145.
2	7.9	16.9	28.5	38.7	56.7	83.3	114.	153.
2¼	8.7	18.3	30.7	41.8	61.0	88.8	121.	162.
2½	9.4	19.7	32.8	44.9	65.2	94.4	128.	171.
2¾	10.2	21.1	35.0	48.0	69.5	100.	136.	179.
3	11.0	22.5	37.2	51.1	73.7	105.	143.	188.
3¼	11.7	23.9	39.3	54.3	78.0	111.	150.	197.
3½	12.6	25.3	41.5	57.4	82.3	116.	157.	205.
3¾	13.4	26.7	43.7	60.5	86.5	122.	164.	214.
4	14.1	28.1	45.9	63.6	90.8	128.	170.	223.
4¼	14.9	29.4	48.0	66.7	95.0	134.	177.	231.
4½	15.7	30.8	50.2	69.9	99.3	139.	185.	240.
4¾	16.5	32.2	52.4	73.0	104.	145.	192.	249.
5	17.2	33.6	54.5	76.1	108.	150.	199.	258.
5¼	18.1	35.0	56.7	79.2	112.	156.	206.	266.
5½	18.8	36.4	58.9	82.3	116.	161.	213.	275.
5¾	19.6	37.8	61.1	85.5	120.	166.	220.	284.
6	20.4	39.2	63.2	88.6	124.	172.	227.	292.
6½	21.9	42.0	67.6	95.1	133.	184.	241.	310.
7	23.5	44.7	71.9	101.	142.	195.	255.	327.
7½	25.1	47.5	76.1	108.	150.	206.	269.	345.
8	26.6	50.3	80.6	114.	159.	217.	284.	362.
8½	28.2	53.1	85.0	120.	167.	227.	298.	379.
9	29.8	55.9	89.3	126.	176.	239.	312.	397.
9½	31.3	58.7	93.7	133.	185.	250.	325.	414.
10	32.8	61.4	98.0	139.	193.	261.	340.	431.
10½	34.5	64.2	103.	145.	202.	272.	354.	449.
11	36.0	67.0	107.	151.	210.	284.	368.	466.
11½	37.6	69.8	111.	158.	218.	295.	382.	484.
12	39.2	72.5	115.	164.	227.	306.	396.	501.
Heads	1.8	5.8	11.1	13.6	22.6	39.0	58.0	83.5

WEIGHT IN POUNDS PER FOOT OF ROUND COLD DRAWN SEAMLESS STEEL TUBING

Outside Diameter in Inches	Thickness B. W. G. and Fractions and Equivalents in Decimals of an Inch																	
	20	18	16	14	13	12	11	10	9/32	11/64	7/32	1/4	17/64	5/16	1/2	5/8	3/4	7/8	1
	.035	.049	.065	.083	.095	.109	.120	.134	.156	.188	.219	.250	.313	.375	.500	.625	.750	.875	1.00
1/4	.17	.24	.30	.37	.41	.45	.49	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5/16	.22	.30	.39	.48	.54	.60	.65	.70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3/8	.27	.37	.47	.59	.66	.75	.81	.88	.99	1.13	.....	.....	.....	.....	.....	.....	.....	.....	.....
7/16	.31	.43	.56	.70	.79	.89	.97	1.06	1.20	1.38	1.53	.....	.....	.....	.....	.....	.....	.....	.....
1/2	.36	.50	.65	.81	.92	1.04	1.13	1.24	1.41	1.63	1.82	2.00	.....	.....	.....	.....	.....	.....	.....
9/16	.41	.56	.74	.92	1.04	1.18	1.29	1.42	1.61	1.88	2.12	2.33	.....	.....	.....	.....	.....	.....	.....
5/8	.45	.63	.82	1.03	1.17	1.33	1.45	1.60	1.82	2.13	2.41	2.67	3.13	3.50	.....	.....	.....	.....	.....
11/16	.50	.69	.91	1.14	1.30	1.47	1.61	1.77	2.03	2.38	2.70	3.00	3.54	4.00	.....	.....	.....	.....	.....
3/4	.55	.76	1.00	1.25	1.42	1.62	1.77	1.95	2.24	2.63	2.99	3.33	3.96	4.50	5.33	.....	.....	.....	.....
13/16	.....	.....	1.17	1.48	1.68	1.91	2.09	2.31	2.66	3.13	3.57	4.00	4.79	5.50	6.67	.....	.....	.....	.....
7/8	.....	.....	1.34	1.70	1.93	2.20	2.41	2.67	3.07	3.63	4.16	4.67	5.63	6.50	8.00	9.17	.....	.....	.....
15/16	.....	.....	1.52	1.92	2.19	2.49	2.73	3.03	3.49	4.13	4.74	5.33	6.46	7.50	9.34	10.84	.....	.....	.....
1	.....	.....	1.69	2.14	2.44	2.78	3.05	3.39	3.91	4.63	5.32	6.00	7.29	8.50	10.67	12.50	.....	.....	.....
1 1/16	.....	.....	1.86	2.36	2.69	3.07	3.37	3.74	4.32	5.13	5.91	6.67	8.13	9.51	12.00	14.17	.....	.....	.....
1 1/8	.....	.....	.....	.....	2.95	3.37	3.69	4.10	4.74	5.63	6.49	7.33	8.96	10.50	13.34	15.84	18.00	19.84	21.34
1 3/16	.....	.....	.....	.....	3.20	3.66	4.01	4.45	5.16	6.13	7.07	8.00	9.79	11.50	14.67	17.50	20.00	22.17	24.01
1 1/4	.....	.....	.....	.....	3.45	3.94	4.33	4.82	5.57	6.63	7.66	8.67	10.63	12.50	16.00	19.17	22.00	24.51	26.67
1 5/16	.....	.....	.....	.....	.....	.....	4.65	5.18	5.99	7.13	8.24	9.34	11.46	13.50	17.34	20.84	24.01	26.84	29.34
1 3/8	.....	.....	.....	.....	.....	.....	4.97	5.53	6.41	7.63	8.82	10.00	12.29	14.50	18.67	22.50	26.00	29.17	32.01
1 7/16	.....	.....	.....	.....	.....	.....	.....	5.89	6.82	8.13	9.41	10.67	13.13	15.50	20.00	24.17	28.01	31.51	34.67
1 1/2	.....	.....	.....	.....	.....	.....	.....	6.25	7.24	8.63	9.99	11.34	13.96	16.50	21.34	25.84	30.01	33.84	37.34
1 3/4	.....	.....	.....	.....	.....	.....	.....	6.61	7.66	9.13	10.58	12.00	14.79	17.51	22.67	27.51	32.01	36.18	40.01
2	.....	.....	.....	.....	.....	.....	.....	6.96	8.07	9.63	11.16	12.67	15.63	18.51	24.00	29.17	34.01	38.51	42.68
2 1/2	.....	.....	.....	.....	.....	.....	.....	7.67	8.91	10.63	12.32	14.00	17.30	20.51	26.67	32.51	38.01	43.17	48.01

THEORETICAL WEIGHT OF STEEL CIRCLES

Diameter	1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8
16..	7	11	15	18	22	25	29	.....	.....	.....	.....	.....	.....	.....
17..	8	12	16	20	24	28	32	.....	.....	.....	.....	.....	.....	.....
18..	9	14	18	23	27	32	36	.....	.....	.....	.....	.....	.....	.....
19..	10	15	20	25	30	35	40	.....	.....	.....	.....	.....	.....	.....
20..	11	17	23	28	34	39	45	.....	.....	.....	.....	.....	.....	.....
21..	12	19	25	31	37	43	49	.....	.....	.....	.....	.....	.....	.....
22..	14	20	27	34	41	47	54	.....	.....	.....	.....	.....	.....	.....
23..	15	22	30	37	44	52	59	.....	.....	.....	.....	.....	.....	.....
24..	16	24	32	40	48	56	64	.....	.....	.....	.....	.....	.....	.....
25..	18	26	35	44	53	61	70	.....	.....	.....	.....	.....	.....	.....
26..	19	28	38	47	56	66	75	.....	.....	.....	.....	.....	.....	.....
27..	20	30	41	51	61	71	81	.....	.....	.....	.....	.....	.....	.....
28..	22	33	44	55	65	76	87	.....	.....	.....	.....	.....	.....	.....
29..	24	35	47	59	71	82	94	.....	.....	.....	.....	.....	.....	.....
30..	25	38	50	63	75	88	100	.....	.....	.....	.....	.....	.....	.....
31..	27	40	54	67	80	94	107	.....	.....	.....	.....	.....	.....	.....
32..	29	43	57	71	86	100	114	.....	.....	.....	.....	.....	.....	.....
33..	30	45	61	76	91	106	121	.....	.....	.....	.....	.....	.....	.....
34..	32	48	65	81	97	113	129	.....	.....	.....	.....	.....	.....	.....
35..	34	51	68	85	102	119	136	.....	.....	.....	.....	.....	.....	.....
36..	36	54	72	90	108	126	144	162	180	198	216	234	252	
37..	38	57	76	95	115	134	153	172	191	210	229	248	267	
38..	40	60	80	100	121	141	161	181	201	221	241	261	281	
39..	42	64	85	106	127	148	169	190	212	233	254	275	296	
40..	45	67	89	111	134	156	178	200	223	245	267	289	312	
41..	47	70	94	117	141	164	187	211	234	258	281	304	327	
42..	49	74	98	123	148	172	197	221	246	270	295	319	344	
43..	52	77	103	129	155	180	206	232	258	283	309	335	360	
44..	54	81	108	135	162	188	215	242	269	296	323	350	377	
45..	56	85	113	141	169	197	225	253	282	310	338	366	394	
46..	59	88	118	147	177	206	235	265	294	324	353	383	412	
47..	62	92	123	154	185	215	246	277	308	338	369	399	430	
48..	64	96	128	160	193	225	257	289	321	353	385	417	449	
49..	67	100	134	167	201	234	267	301	334	367	401	434	467	
50..	70	105	139	174	209	244	279	313	348	383	418	452	487	
51..	.....	109	145	181	217	253	289	325	362	398	434	470	506	
52..	.....	113	151	188	226	263	301	339	376	414	452	489	527	
53..	.....	117	156	195	235	273	313	352	391	430	469	508	547	
54..	.....	122	162	203	244	284	325	365	406	446	487	527	568	
55..	.....	126	168	210	253	295	337	379	421	463	505	547	589	
56..	.....	131	175	218	262	305	349	393	436	480	524	567	610	
57..	.....	136	181	226	272	317	362	407	453	498	543	587	633	
58..	.....	141	187	234	281	328	375	421	468	515	562	609	655	
59..	.....	145	194	242	291	339	387	436	484	533	581	629	678	
60..	.....	150	200	250	301	351	401	451	501	551	601	651	701	
61..	.....	155	207	259	311	362	414	466	518	569	621	673	724	
62..	.....	161	214	268	321	375	428	482	535	589	642	695	749	
63..	.....	166	221	276	332	387	442	457	553	608	663	718	774	
64..	.....	171	228	285	342	399	456	513	570	627	684	741	798	
65..	.....	177	235	294	353	412	471	529	588	647	706	764	823	
66..	.....	182	243	303	364	425	485	546	607	667	728	788	848	
67..	.....	188	250	313	375	438	500	563	625	688	750	812	874	
68..	.....	193	257	322	386	450	515	579	643	708	772	836	900	
69..	.....	199	265	331	398	464	530	596	663	729	795	861	927	
70..	.....	205	273	341	409	477	545	613	682	750	818	886	954	
71..	.....	211	281	351	421	491	561	631	702	772	842	912	982	
72..	.....	217	289	361	433	505	577	649	722	794	866	937	1009	
73..	.....	223	297	371	445	519	593	667	742	816	890	964	1038	
74..	.....	228	305	381	458	534	610	686	763	839	915	990	1066	
75..	.....	235	313	391	470	548	626	704	783	861	939	1017	1095	
76..	.....	241	322	402	482	563	643	723	804	884	964	1045	1125	
77..	.....	248	330	413	495	578	660	743	825	908	990	1073	1155	
78..	.....	254	339	423	508	593	678	762	847	932	1016	1101	1186	
79..	.....	260	348	434	521	608	695	782	869	956	1043	1129	1216	
80..	.....	267	356	445	534	623	713	802	891	980	1069	1158	1247	

For variations in weight of Sheared Plates, see page 843.

THEORETICAL WEIGHT OF STEEL CIRCLES
CONTINUED

Diameter	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
81..	365	457	548	639	731	822	913	1004	1096	1187	1278	1370	1461
82..	374	468	561	655	749	842	936	1029	1123	1217	1310	1404	1497
83..	384	479	575	671	767	863	959	1055	1151	1246	1342	1438	1534
84..	393	491	589	687	786	884	982	1080	1179	1277	1375	1473	1571
85..	402	503	603	704	805	905	1006	1106	1207	1307	1408	1508	1609
86..	412	515	618	721	824	926	1029	1132	1235	1338	1441	1544	1647
87..	422	527	632	738	843	948	1054	1159	1265	1370	1475	1581	1686
88..	431	539	647	755	863	970	1078	1186	1294	1402	1509	1617	1725
89..	441	551	661	771	882	992	1102	1212	1323	1433	1543	1653	1763
90..	451	564	677	789	902	1015	1128	1240	1353	1466	1579	1691	1804
91..	461	576	692	807	922	1037	1153	1268	1383	1495	1614	1729	1844
92..	471	589	707	825	943	1060	1178	1296	1414	1532	1649	1767	1885
93..	482	602	722	843	963	1084	1204	1324	1445	1565	1686	1806	1926
94..	492	615	738	861	984	1107	1230	1353	1476	1599	1722	1845	1968
95..	503	628	754	879	1005	1131	1256	1382	1507	1633	1759	1884	2010
96..	513	641	769	897	1026	1154	1282	1410	1538	1666	1795	1923	2052
97..	524	654	785	916	1047	1178	1309	1440	1570	1701	1832	1963	2095
98..	535	668	801	935	1069	1202	1336	1469	1603	1737	1870	2004	2139
99..	546	682	818	954	1091	1227	1363	1500	1636	1772	1908	2045	2183
100..	557	696	835	974	1113	1252	1391	1530	1669	1809	1948	2087	2227
101..	568	710	852	994	1136	1278	1420	1562	1704	1846	1988	2130	2272
102..	579	724	869	1014	1158	1303	1448	1593	1738	1882	2027	2172	2317
103..	591	739	886	1034	1182	1329	1477	1624	1772	1919	2067	2214	2363
104..	602	753	903	1054	1204	1355	1505	1656	1806	1957	2107	2258	2409
105..	614	768	921	1074	1228	1381	1534	1688	1841	1994	2148	2302	2455
106..	626	782	939	1095	1251	1408	1564	1720	1877	2033	2189	2346	2502
107..	637	797	956	1116	1275	1434	1593	1753	1912	2071	2231	2390	2550
108..	649	812	974	1136	1299	1461	1623	1786	1948	2110	2273	2435	2598
109...	662	827	992	1158	1323	1488	1653	1819	1984	2149	2315	2480	2646
110..	673	842	1010	1179	1347	1516	1684	1853	2021	2189	2358	2526	2695
111..	686	857	1028	1200	1372	1543	1715	1886	2058	2229	2401	2572	2744
112..	693	873	1048	1222	1397	1571	1746	1920	2095	2270	2444	2619	2793
113..	711	889	1066	1244	1422	1599	1777	1955	2133	2310	2488	2666	2844
114..	724	904	1085	1266	1447	1628	1809	1990	2171	2351	2532	2713	2894
115..	736	920	1104	1288	1473	1657	1841	2025	2209	2393	2577	2761	2945
116..	749	936	1124	1311	1498	1686	1873	2060	2247	2435	2622	2809	2997
117..	762	953	1143	1334	1524	1715	1905	2096	2286	2477	2667	2858	3048
118..	775	969	1163	1357	1550	1744	1938	2132	2326	2519	2713	2907	3101
119..	788	985	1183	1380	1577	1774	1971	2168	2365	2562	2759	2956	3154
120..	802	1002	1203	1403	1604	1804	2005	2205	2406	2606	2807	3007	3208
121..	815	1019	1223	1426	1630	1834	2038	2242	2445	2649	2853	3057	3260
122..	829	1036	1243	1450	1657	1864	2072	2279	2486	2693	2900	3107	3314
123..	842	1053	1263	1474	1685	1895	2106	2316	2527	2737	2948	3159	3369
124..	856	1070	1284	1498	1712	1926	2140	2354	2568	2782	2996	3210	3424
125..	870	1087	1305	1522	1740	1957	2175	2392	2610	2827	3045	3262	3480
126..	884	1105	1326	1547	1768	1989	2210	2431	2652	2872	3093	3315	3535
127..	898	1122	1347	1571	1796	2020	2245	2469	2694	2918	3143	3367	3592
128..	912	1140	1368	1596	1824	2052	2280	2508	2736	2964	3192	3420	3649
129..	926	1158	1390	1621	1853	2085	2316	2548	2779	3011	3242	3474	3706
130..	941	1176	1411	1646	1882	2117	2352	2587	2822	3058	3293	3528	3764
131..	955	1194	1433	1672	1911	2150	2389	2627	2866	3105	3344	3583	3822
132..	970	1213	1455	1698	1940	2183	2425	2668	2910	3153	3395	3638	3880
133..	985	1231	1477	1723	1970	2216	2462	2708	2954	3200	3446	3693	3939
134..	1000	1250	1500	1750	1999	2249	2499	2749	2999	3249	3499	3749	3999
135..	1015	1268	1522	1775	2030	2284	2537	2790	3044	3298	3551	3805	4069
136..	1029	1286	1543	1801	2058	2315	2572	2830	3087	3344	3601	3859	4116
137..	1044	1305	1566	1827	2088	2349	2610	2871	3132	3393	3654	3916	4177
138..	1059	1324	1589	1854	2119	2384	2649	2914	3178	3443	3708	3973	4238
139..	1075	1344	1612	1881	2150	2418	2687	2956	3225	3493	3762	4031	4300
140..	1090	1363	1636	1908	2181	2453	2726	2999	3271	3544	3816	4089	4362
141..	1106	1383	1659	1936	2212	2489	2765	3042	3318	3595	3871	4148	4424
142..	1122	1402	1683	1963	2244	2524	2804	3085	3365	3646	3926	4207	4487
143..	1138	1422	1706	1991	2275	2560	2844	3128	3413	3697	3982	4266	4551
144..	1154	1442	1730	2019	2307	2596	2884	3172	3461	3749	4038	4326	4614

For variations in weight of Sheared Plates, see page 843.

ESTIMATED WEIGHTS OF BLACK STEEL SHEETS — POUNDS PER SHEET

U. S. Gauge	10	12	14	16	18	20	22	24	26	27	28	29	30
Thickness, Inches	1/8	7/64	5/64	1/16	1/20	1/32	1/40	1/80	1/160	1/320	1/64	1/160	1/80
Pounds per Square Feet	5.738	4.462	3.187	2.55	2.04	1.53	1.275	1.02	.765	.7012	.6375	.5737	.51
Size 24× 72	68.86	53.54	38.24	30.60	24.48	18.36	15.30	12.24	9.18	8.41	7.65	6.88	6.12
24× 84	80.33	62.47	44.62	35.70	28.56	21.42	17.85	14.28	10.71	9.82	8.93	8.03	7.14
24× 96	91.81	71.40	51.00	40.80	32.64	24.48	20.40	16.32	12.24	11.22	10.20	9.18	8.16
24×101	96.59	75.12	53.65	42.92	34.35	25.75	21.46	17.17	12.88	11.80	10.73	9.66	8.59
24×108	103.28	80.32	57.37	45.90	36.72	27.54	22.94	18.36	13.77	12.63	11.47	10.33	9.18
24×120	115.03	89.25	63.75	51.00	40.80	30.60	25.50	20.40	15.30	14.02	12.75	11.47	10.20
24×144	137.72	107.10	76.50	61.20	48.96	36.72	30.60	24.48	18.36	16.83	15.30	13.77	12.24
26× 72	74.59	58.01	41.43	33.15	26.52	19.89	16.57	13.26	9.95	9.12	8.29	7.46	6.63
26× 84	87.03	67.67	48.34	38.68	30.94	23.20	19.34	15.46	11.60	10.63	9.66	8.70	7.73
26× 96	99.46	77.35	55.25	44.20	35.36	26.52	22.10	17.68	13.26	12.15	11.04	9.94	8.84
26×101	104.65	81.37	58.14	46.50	37.20	28.90	23.25	18.60	13.95	12.79	11.63	10.46	9.30
26×108	111.88	87.02	62.16	49.72	39.78	29.83	24.85	19.89	14.92	13.68	12.43	11.18	9.94
26×120	124.31	96.68	69.06	55.25	44.20	33.14	27.62	22.10	16.57	15.19	13.81	12.43	11.04
26×144	149.17	116.02	82.87	66.30	53.04	39.78	33.14	26.52	19.88	18.23	16.57	14.92	13.26
28× 72	80.33	62.47	44.62	35.70	28.56	21.42	17.85	14.28	10.71	9.82	8.93	8.03	7.14
28× 84	93.72	72.88	52.05	41.65	33.32	24.99	20.83	16.66	12.50	11.45	10.41	9.37	8.33
28× 96	107.10	83.30	59.50	47.60	38.08	28.56	23.80	19.04	14.28	13.08	11.90	10.71	9.51
28×101	112.68	87.64	62.60	50.07	40.04	30.05	25.04	20.03	15.02	13.77	12.52	11.27	10.01
28×108	120.50	93.72	66.94	53.54	42.84	32.12	26.77	21.42	16.06	14.73	13.40	12.04	10.71
28×120	133.87	104.12	74.38	59.50	47.60	35.70	29.75	23.80	17.85	16.36	14.87	13.38	11.90
28×144	160.66	124.94	89.24	71.40	57.12	42.84	35.70	28.56	21.42	19.63	17.85	16.06	14.28
30× 72	86.07	66.93	47.81	38.25	30.60	22.95	19.13	15.30	11.48	10.52	9.56	8.61	7.65
30× 84	100.42	78.08	55.77	44.62	35.70	26.78	22.31	17.85	13.39	12.27	11.16	10.04	8.92
90× 96	114.75	89.25	63.75	51.00	40.80	30.60	25.50	20.40	15.30	14.02	12.75	11.47	10.20
30×101	120.73	93.90	67.07	53.65	42.92	32.20	26.82	21.46	16.09	14.76	13.41	12.07	10.73
30×108	129.10	100.41	71.73	57.37	45.90	34.42	28.68	22.95	17.21	15.78	14.34	12.91	11.48
30×120	143.44	111.57	79.69	63.75	51.00	38.25	31.87	25.50	19.12	17.53	15.94	14.34	12.75
30×144	172.12	133.87	95.62	76.50	61.20	45.90	38.25	30.60	22.95	21.04	19.12	17.21	15.30

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ESTIMATED WEIGHTS OF BLACK STEEL SHEETS—CONTINUED

U. S. Gauge	10	12	14	16	18	20	22	24	26	27	28	29	30
Size 36× 72	103.28	80.32	57.37	45.90	36.72	27.54	22.95	18.36	13.77	12.62	11.48	10.33	9.18
36× 77	110.46	85.89	61.35	49.09	39.27	29.45	24.54	19.64	14.73	13.50	12.27	11.04	9.82
36× 84	120.50	93.70	66.93	53.55	42.84	32.13	26.78	21.42	16.07	14.73	13.39	12.05	10.71
36× 96	137.70	107.10	76.50	61.20	48.96	36.72	30.60	24.48	18.36	16.83	15.30	13.77	12.24
36×108	154.92	120.50	86.07	68.85	55.08	41.30	34.42	27.54	20.65	18.93	17.21	15.49	13.77
36×120	172.12	133.87	95.62	76.50	61.20	45.90	38.25	30.60	22.95	21.04	19.12	17.21	15.30
36×144	206.55	160.65	114.75	91.80	73.44	55.08	45.90	36.72	27.54	25.20	22.95	20.65	18.36
42× 72	120.50	93.70	66.93	53.55	42.84	32.13	26.78	21.42	16.07	14.72	13.39	12.05	10.71
42× 77	128.88	100.24	71.57	57.27	45.82	34.36	28.64	22.91	17.18	15.75	14.32	12.89	11.45
42× 84	140.57	109.34	78.10	62.48	49.98	37.47	31.24	24.99	18.73	17.14	15.62	14.02	12.49
42× 96	160.65	124.95	89.25	71.40	57.12	42.84	35.70	28.56	21.42	19.63	17.85	16.06	14.28
42×108	180.73	140.56	100.40	80.32	64.26	48.19	40.16	32.13	24.10	22.09	20.08	18.07	16.07
42×120	200.81	156.19	111.57	89.25	71.40	53.56	44.62	35.70	26.77	24.54	22.31	20.08	17.85
42×144	240.97	187.42	133.87	107.10	85.68	64.26	53.55	42.84	32.13	29.46	26.76	24.10	21.42
48× 72	137.71	107.09	76.49	61.20	48.96	36.72	30.60	24.48	18.36	16.83	15.30	13.77	12.24
48× 77	147.29	114.54	81.81	65.46	52.37	39.28	32.73	26.18	19.64	18.00	16.36	14.73	13.09
48× 84	160.66	124.93	89.24	71.40	57.12	42.84	35.70	28.56	21.42	19.63	17.85	16.06	14.28
48× 96	183.60	142.80	102.00	81.60	65.28	48.96	40.80	32.64	24.48	22.44	20.40	18.36	16.32
48×108	206.55	160.65	114.75	91.80	73.44	55.08	45.90	36.72	27.54	25.24	22.95	20.65	18.36
48×120	229.50	178.50	127.50	102.00	81.60	61.20	51.00	40.80	30.60	28.05	25.50	24.95	20.40
48×138	263.95	205.25	146.60	117.30	93.84	70.38	58.65	46.92	35.19	32.26	29.33	26.39	23.46
48×144	275.40	214.20	153.00	122.40	97.92	73.44	61.20	48.96	36.72	33.66	30.60	27.54	24.48
54× 77	165.69	128.84	92.02	73.64	58.91	44.18							
54× 96	206.57	160.63	114.73	91.83	73.44	55.08							
54×108	232.39	180.71	129.07	103.28	82.62	61.97							
54×120	258.21	200.79	143.42	114.75	91.80	68.85							
54×138	296.94	230.91	164.93	131.96	105.57	79.18							
54×144	309.85	240.95	172.10	137.70	110.16	82.62							
60× 77	183.66	143.16	102.25	81.81	.....	.....							
60× 96	229.52	178.48	127.48	102.02	.....	.....							
60×108	258.21	200.79	143.42	114.75	.....	.....							
60×120	286.90	223.10	159.36	127.50	.....	.....							
60×138	329.94	256.57	183.26	146.64	.....	.....							
60×144	344.28	267.72	191.22	153.00	.....	.....							

These figures are given for convenience in estimating only, and may vary somewhat in actual practice. The weights are for Steel Sheets.

ESTIMATED WEIGHTS OF GALVANIZED STEEL SHEETS

U. S. Gauge	10			12			14			16			18			20		
Lbs. per Sq. Ft.	5.781 Pounds			4.531 Pounds			3.281 Pounds			2.656 Pounds			2.156 Pounds			1.656 Pounds		
Size	Wt. per Sheet	Wt. per Bundle	Sheets per Bundle	Wt. per Sheet	Wt. per Bundle	Sheets per Bundle	Wt. per Sheet	Wt. per Bundle	Sheets per Bundle	Wt. per Sheet	Wt. per Bundle	Sheets per Bundle	Wt. per Sheet	Wt. per Bundle	Sheets per Bundle	Wt. per Sheet	Wt. per Bundle	Sheets per Bundle
24× 72	69.4	138	2	54.37	163	3	39.37	157	4	31.9	159	5	25.9	155	6	19.9	158	8
24× 84	80.9	161	2	63.4	126	2	45.9	137	3	37.2	148	4	30.2	150	5	23.2	162	7
24× 96	92.5	185	2	72.5	145	2	52.5	157	3	42.5	170	4	34.5	138	4	26.5	159	6
24×120	115.62	115	1	90.62	181	2	65.62	131	2	53.1	159	3	43.1	129	3	33.1	165	5
26× 72	75.1	150	2	58.9	176	3	42.65	170	4	34.5	138	4	28.0	140	5	21.5	150	7
26× 84	87.6	175	2	68.69	137	2	49.74	149	3	40.2	160	4	32.7	163	5	25.1	150	6
26× 96	100.1	200	2	78.5	157	2	56.8	170	3	46.0	138	3	37.4	149	4	28.7	143	5
26×120	125.25	125	1	98.17	196	2	71.09	142	2	57.55	172	3	46.72	140	3	35.9	143	4
28× 72	80.8	161	2	63.4	126	2	45.9	137	3	37.2	148	4	30.2	150	5	23.2	162	7
28× 84	94.2	188	2	73.99	148	2	53.58	160	3	43.4	173	4	35.2	140	4	27.0	135	5
28× 96	107.88	215	2	84.55	169	2	61.2	183	3	49.6	148	3	40.2	160	4	30.9	154	5
28×108	121.4	121	1	95.15	190	2	68.9	137	2	55.8	167	3	45.3	181	4	34.8	137	4
28×120	134.88	134	1	105.72	211	2	76.56	153	2	62.0	186	3	50.3	150	3	38.6	154	4
30× 72	86.8	173	2	67.9	135	2	49.2	147	3	39.8	159	4	32.3	161	5	24.8	149	6
30× 84	101.0	202	2	79.29	158	2	57.4	172	3	46.5	139	3	37.7	150	4	28.8	144	5
30× 96	115.6	231	2	90.6	181	2	65.6	131	2	53.2	159	3	43.1	172	4	33.1	165	5
30×120	144.53	144	1	113.27	113	1	82.0	164	2	66.4	132	2	53.9	161	3	41.4	165	4
36× 72	104.1	208	2	81.56	163	2	59.0	177	3	47.8	143	3	38.8	155	4	29.8	149	5
36× 84	121.4	121	1	95.1	190	2	68.9	137	2	55.8	167	3	45.3	135	3	34.8	139	4
36× 96	138.1	138	1	108.7	108	1	78.75	157	2	63.8	127	2	51.8	155	3	39.8	159	4
36×120	173.44	173	1	135.93	135	1	98.43	196	2	79.7	159	2	64.7	129	2	49.7	149	3
42× 72	121.4	121	1	95.15	95	1	68.9	137	2	55.8	157	3	45.3	181	4	34.8	174	5
42× 84	141.63	141	1	111.01	111	1	80.38	160	2	65.1	190	3	52.8	158	3	40.6	162	4
42× 96	161.87	161	1	126.87	126	1	91.87	183	2	74.4	148	2	60.4	181	3	46.4	185	4
42×120	202.34	202	1	158.59	158	1	114.84	114	1	93.0	186	2	75.5	151	2	58.0	174	3
48× 72	138.8	138	1	108.74	108	1	78.74	157	2	63.8	127	2	51.8	155	3	39.8	159	4
48× 84	161.8	161	1	126.8	126	1	91.8	183	2	74.4	148	2	60.3	180	3	46.3	185	4
48× 96	184.99	184	1	145.0	145	1	105.0	105	1	85.0	170	2	69.0	138	2	53.0	159	3
48×120	231.24	231	1	181.24	181	1	131.24	131	1	106.2	106	1	86.2	172	2	66.2	132	2

ESTIMATED WEIGHTS OF GALVANIZED STEEL SHEETS — CONTINUED

U. S. Gauge	22			24			26			27			28			30		
Lbs. per Sq. Ft.	1.406 Pounds			1.156 Pounds			0.9062 Pounds			.8437 Pounds			.7812 Pounds			.6562 Pounds		
Size	Wt. per Sheet	Wt. per Bundle	Sheets per Bundle	Wt. per Sheet	Wt. per Bundle	Sheets per Bundle	Wt. per Sheet	Wt. per Bundle	Sheets per Bundle	Wt. per Sheet	Wt. per Bundle	Sheets per Bundle	Wt. per Sheet	Wt. per Bundle	Sheets per Bundle	Wt. per Sheet	Wt. per Bundle	Sheets per Bundle
24× 72	16.87	151	9	13.87	152	11	10.87	152	14	10.12	151	15	9.37	149	16	7.87	150	19
24× 84	19.68	157	8	16.18	145	9	12.68	152	12	11.81	153	13	10.93	153	14	9.18	146	16
24× 96	22.5	157	7	18.5	148	8	14.5	145	10	13.5	148	11	12.5	150	12	10.5	157	15
24×120	28.12	140	5	23.12	161	7	18.12	145	8	16.87	151	9	15.62	156	10	13.12	157	12
26× 72	18.28	146	8	15.03	150	10	11.78	153	13	10.96	153	14	10.15	152	15	8.53	145	17
26× 84	21.3	149	7	17.52	140	8	13.73	151	11	12.78	153	12	11.84	153	13	9.93	148	15
26× 96	24.37	146	6	20.00	160	8	15.7	157	10	14.62	146	10	13.53	148	11	11.37	158	14
26×120	30.47	152	5	25.05	150	6	19.63	157	8	18.28	146	8	16.92	152	9	14.21	156	11
28× 72	19.68	157	8	16.18	145	9	12.68	152	12	11.81	153	13	10.93	153	14	9.18	146	16
28× 84	22.96	160	7	18.88	151	8	14.79	147	10	15.77	151	11	12.75	153	12	10.71	149	14
28× 96	26.24	157	6	21.57	150	7	16.90	152	9	15.74	157	10	14.57	145	10	12.24	146	12
28×108	29.53	147	5	24.28	145	6	19.03	152	8	17.72	159	9	16.41	147	9	13.78	151	11
28×120	32.81	164	5	26.98	161	6	21.14	148	7	19.68	157	8	18.22	145	8	15.31	153	10
30× 72	21.00	147	7	17.34	156	9	13.59	149	11	12.65	151	12	11.71	152	13	9.84	147	15
30× 84	24.6	148	6	20.23	141	7	15.85	158	10	14.76	147	10	13.67	150	11	11.48	149	13
30× 96	28.12	140	5	23.12	161	7	18.12	144	8	16.87	151	9	15.62	156	10	13.12	144	11
30×120	35.15	140	4	28.90	144	5	22.65	158	7	21.09	147	7	19.53	156	8	16.4	147	9
36× 72	25.3	151	6	20.8	145	7	16.3	146	9	15.18	151	10	14.00	154	11	11.81	153	13
36× 84	29.53	147	5	24.28	145	6	19.3	154	8	17.7	159	9	16.4	147	9	13.78	151	11
36× 96	33.75	168	5	27.75	166	6	21.75	152	7	20.25	162	8	18.75	150	8	15.75	157	10
36×120	42.18	168	4	34.68	173	5	27.18	163	6	25.31	151	6	23.43	164	7	19.68	157	8
42× 72	29.4	176	6	24.27	169	7	19.02	190	10	.....	.....	.....	.....	.....	.....	.....	.....	.....
42× 84	34.4	172	5	28.32	169	6	22.19	177	8	.....	.....	.....	.....	.....	.....	.....	.....	.....
42× 96	39.4	157	4	32.37	194	6	25.37	177	7	.....	.....	.....	.....	.....	.....	.....	.....	.....
42×120	49.2	196	4	40.46	161	4	31.71	190	6	.....	.....	.....	.....	.....	.....	.....	.....	.....

WEIGHTS OF IRON AND STEEL PLATE

POUNDS PER SQUARE FOOT

Thickness	Iron—Estimating	Steel—Estimating	Steel—Theoretical	Thickness	Iron—Estimating	Steel—Estimating	Steel—Theoretical
1/32	1.35	1.40	1.275	11/16	28.25	29.00	28.05
1/16	2.70	2.75	2.550	3/4	30.75	31.50	30.60
3/32	4.00	4.10	3.825	13/16	33.50	34.00	33.15
1/8	5.40	5.50	5.100	7/8	36.00	36.75	35.70
5/32	6.75	6.90	6.375	15/16	38.50	39.25	38.25
3/16	8.10	8.30	7.650	1	41.00	41.75	40.80
7/32	9.50	9.75	8.925	1 1/8	43.50	44.50	43.35
1/4	10.75	11.00	10.200	1 1/4	46.00	46.75	45.90
9/32	12.00	12.25	11.475	1 3/8	48.50	49.50	48.45
5/16	13.25	13.50	12.750	1 1/2	51.00	52.00	51.00
11/32	14.50	14.75	14.025	1 5/8	53.50	54.50	53.55
3/8	16.00	16.25	15.300	1 3/4	56.00	57.25	56.10
13/32	17.00	17.50	16.575	1 7/8	58.50	60.00	58.65
7/16	18.25	18.75	17.850	2 1/2	61.00	62.50	61.20
15/32	19.50	20.00	19.125	2 5/8	66.25	67.75	66.30
1/2	20.75	21.25	20.400	2 3/4	71.25	72.75	71.40
9/16	23.25	23.75	22.950	2 7/8	76.25	78.00	76.50
5/8	25.75	26.25	25.500	2	81.50	83.25	81.60

For variations in weight of Sheared Plates, see page 843.

CORRUGATED SHEETS

Gauge Nos.	Weights in Pounds per Square				Standard Lengths—Width 26 inches	Sheets per Square—100 square feet	Square Feet per Sheet
	Black and Painted		Galvanized				
	2, 2½ and 3 inch Corrug.	1¼ inch Corrug.	2, 2½ and 3 inch Corrug.	1¼ inch Corrug.			
					60	9.231	10.833
					72	7.692	13.000
16	271	.....	286	.....	84	6.593	15.166
18	217	.....	232	.....	96	5.769	17.333
20	163	170	178	185	108	5.128	19.500
21	150	156	165	.....	120	4.616	21.666
22	136	142	151	157	144	3.846	26.000
23	123	128	138	.....			
24	110	114	124	129			
25	96	100	111	.....			
26	83	86	98	101			
27	76	79	91	94			
28	68	72	85	87			

The above applies on 1¼ inch, 2 inch, 2½ inch, 3 inch and 5 inch Corrugations.

See stock, page 313.

10—MISCELLANEOUS DATA

THE miscellaneous data in this section will be found useful in conjunction with the tables for Buildings and Bridges and those for Boilers and Tanks in the following sections.

Suggestions from the users of this book as to additional data which would be helpful to them in their work will be gladly received. It is our desire to keep adding to this information such tables as will be most useful to the different lines of business in which this book is used and suggestions from its users, therefore, would be most welcome

10—MISCELLANEOUS DATA

	Page
Rivets, Dimensions of	1001
Rivets, Shearing and Bearing Value of	1002
Standard Gauges	1004
Decimals of a foot for each 1-64 of an inch	1005
Circles, Circumstances and Areas of	1008
Useful Formulae	1013
Tangents	1014
Cotangents	1014
Sines	1016
Cosines	1016
Secants	1018
Cosecants	1018
Tool Steel Treatment	1020

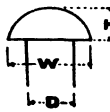
ASSOCIATED SUBJECTS

1000 TO 1093

DIMENSIONS OF RIVETS

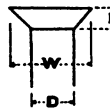
STRUCTURAL RIVETS

BUTTON HEAD



W = 1¾ × D
H = ¾ × D

COUNTERSUNK



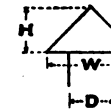
W = 1.839 × D
H = ½ × D
Taper = 51°

BOILER RIVETS

CONE HEAD

T = 1⅛ × D
H = ⅞ × D
W = 1¾ × D

STEEPLE HEAD



H = D
W = 2 × D

Diameter D	Height H	Width W	Diameter D	Width W	Height H	Diameter D	Width T	Height H	Width W	Diameter D	Height H	Width W
½	⅜	7/8	½	15/16	¼	½	15/32	7/16	7/8	½	½	1
* 9/16	27/64	63/64	* 9/16	1 1/32	9/32	* 9/16	17/32	31/64	63/64	* 9/16	9/16	1 1/8
5/8	15/32	1 3/32	5/8	1 5/32	5/16	5/8	19/32	35/64	1 3/32	5/8	5/8	1 1/4
* 11/16	33/64	1 13/64	* 11/16	1 17/64	11/32	11/16	41/64	39/64	1 13/64	11/16	11/16	1 3/8
¾	9/16	1 5/16	¾	1 3/8	3/8	¾	45/64	21/32	1 5/16	¾	¾	1½
* 13/16	39/64	1 27/64	* 13/16	1½	13/32	13/16	49/64	23/32	1 27/64	13/16	13/16	1 5/8
7/8	21/32	1 17/32	7/8	1 19/32	7/16	7/8	13/16	49/64	1 17/32	7/8	7/8	1 3/4
* 15/16	45/64	1 41/64	* 15/16	1 23/32	15/32	15/16	7/8	13/16	1 41/64	15/16	15/16	1 7/8
1	¾	1¾	1	1 27/32	½	1	15/16	7/8	1¾	1	1	2
*1 1/16	51/64	1 55/64	*1 1/16	1 31/64	17/32	*1 1/16	1	15/16	1 55/64	*1 1/16	1 1/16	2 1/8
*1 1/8	27/32	1 31/32	*1 1/8	2 1/16	9/16	1 1/8	1 1/16	53/64	1 31/32	*1 1/8	1 1/8	2 1/4
*1 3/16	57/64	2 5/64	*1 3/16	2 3/16	19/32	*1 3/16	1 7/64	1 1/32	2 5/64	*1 3/16	1 3/16	2 3/8
*1 1/4	15/16	2 9/16	*1 1/4	2 19/64	5/8	*1 1/4	1 11/64	1 3/32	2 9/16	*1 1/4	1 1/4	2 1/2
*1 3/8	1 1/32	2 13/16	*1 3/8	2 5/32	11/16	*1 3/8	1 9/32	1 13/64	2 13/32	*1 3/8	1 3/8	2 3/4
*1½	1⅛	2 5/8	*1½	2 3/4	¾	*1½	1 13/32	1 5/16	2 5/8	*1½	1½	3

*Special Sizes.

SHEARING AND BEARING VALUE OF RIVETS

Unless special values are called for by city building ordinances, it is customary to use a
Shearing value of 12,000 pounds per square inch for Shop Rivets,
Shearing value of 10,000 pounds per square inch for Field Rivets.

Diam. of Rivet Inches	Area Square Inches	Single Shear at 7,500 Pounds	Bearing Value in Pounds for Different Thickness of Plate in Inches at 15,000 Pounds per Square Inch												
			¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1
⅝	.1104	830	1410	1760	2110	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
½	.1963	1470	1880	2340	2810	3280	3750	.....	.....	.....	.....	.....	.....	.....	.....
⅝	.3068	2300	2340	2930	3520	4100	4690	5280	5860	.....	.....	.....	.....	.....	.....
¾	.4418	3310	2810	3520	4220	4920	5630	6330	7030	7720	8440	.....	.....	.....	.....
⅞	.6013	4510	3280	4100	4920	5740	6560	7380	8200	9030	9850	10670	11480	12300	.....
1	.7854	5890	3750	4690	5620	6560	7500	8440	9380	10310	11250	12190	13130	14060	15000

Diam. of Rivet Inches	Area Square Inches	Single Shear at 9,000 Pounds	Bearing Value in Pounds for Different Thickness of Plate in Inches at 18,000 Pounds per Square Inch												
			¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1
⅝	.1104	990	1680	2110	2530	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
½	.1963	1770	2250	2820	3370	3940	4500	.....	.....	.....	.....	.....	.....	.....	.....
⅝	.3068	2760	2790	3480	4180	4870	5580	6330	7030	.....	.....	.....	.....	.....	.....
¾	.4418	3970	3370	4210	5050	5910	6750	7590	8440	9280	10130	.....	.....	.....	.....
⅞	.6013	5410	3940	4920	5910	6880	7870	8860	9840	10830	11810	12800	13780	14770	.....
1	.7854	7060	4500	5620	6750	7870	9000	10120	11250	12370	13500	14630	15750	16880	18000

Diam. of Rivet Inches	Area Square Inches	Single Shear at 10,000 Pounds	Bearing Value in Pounds for Different Thickness of Plate in Inches at 20,000 Pounds per Square Inch												
			¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1
⅝	.1104	1100	1880	2340	2810	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
½	.1963	1960	2500	3130	3750	4380	5000	.....	.....	.....	.....	.....	.....	.....	.....
⅝	.3068	3070	3130	3910	4690	5470	6250	7030	7810	.....	.....	.....	.....	.....	.....
¾	.4418	4420	3750	4690	5630	6560	7500	8440	9380	10310	11250	.....	.....	.....	.....
⅞	.6013	6010	4380	5470	6570	7660	8750	9840	10940	12030	13130	14220	15310	16410	.....
1	.7854	7850	5000	6250	7500	8750	10000	11250	12500	13750	15000	16250	17500	18750	20000

Diam. of Rivet Inches	Area Square Inches	Single Shear at 12,000 Pounds	Bearing Value in Pounds for Different Thickness of Plate in Inches at 24,000 Pounds per Square Inch												
			¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1
⅝	.1104	1320	2250	2810	3380	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
¼	.1963	2360	3000	3750	4500	5250	6000	.....	.....	.....	.....	.....	.....	.....	.....
⅝	.3068	3680	3750	4690	5630	6560	7500	8440	9380	.....	.....	.....	.....	.....	.....
¾	.4418	5300	4500	5630	6750	7880	9000	10130	11250	12380	13500	.....	.....	.....	.....
⅞	.6013	7220	5250	6560	7880	9190	10500	11810	13130	14440	15750	17060	18380	.....	.....
1	.7854	9430	6000	7500	9000	10500	12000	13500	15000	16500	18000	19500	21000	22500	24000

Bearing values given above or to the right of the upper zigzag lines are greater than double shear.

Bearing values given between upper and lower zigzag lines are less than double shear and greater than single shear.

Bearing values given below or to the left of the lower zigzag lines are less than single shear.

STANDARD GAUGES

EQUIVALENTS IN DECIMALS OF AN INCH

Number of Gauge	Thickness in Decimals of an Inch						
	Birmingham	Browne & Sharpe	United States Standard Plate Iron and Steel	British Imperial	Washburn & Moen Mfg.Co.	Trenton Iron Co.	Stubs Steel Wire
7-0's	.....	.....	.500	.500	.....	.....	.....
6-0's	.....	.....	.46875	.464	.....	.....	.....
5-0's	.....	.....	.4375	.432	.....	.45	.....
4-0's	.454	.46	.40625	.400	.3938	.40	.....
3-0's	.425	.40964	.375	.372	.3625	.36	.....
2-0's	.380	.3648	.34375	.348	.3310	.33	.....
0	.340	.32486	.3125	.324	.3065	.305	.....
1	.300	.2893	.28125	.300	.2830	.285	.227
2	.284	.25763	.265625	.276	.2625	.265	.219
3	.259	.22942	.25	.252	.2437	.245	.212
4	.238	.20431	.234375	.232	.2253	.225	.207
5	.220	.18194	.21875	.212	.2070	.205	.204
6	.203	.16202	.203125	.192	.1920	.190	.201
7	.180	.14428	.1875	.176	.1770	.175	.199
8	.165	.12849	.171875	.160	.1620	.160	.197
9	.148	.11443	.15625	.144	.1483	.145	.194
10	.134	.10189	.140625	.128	.1350	.130	.191
11	.120	.090742	.125	.116	.1205	.1175	.188
12	.109	.080808	.109375	.104	.1055	.1050	.185
13	.095	.071961	.09375	.092	.0915	.0925	.182
14	.083	.064084	.078125	.080	.0800	.0800	.180
15	.072	.057068	.0703125	.072	.0720	.0700	.178
16	.065	.05082	.0625	.064	.0625	.0610	.175
17	.058	.045257	.05625	.056	.0540	.0525	.172
18	.049	.040303	.05	.048	.0475	.0450	.168
19	.042	.03589	.04375	.040	.0410	.0400	.164
20	.035	.031961	.0375	.036	.0348	.0350	.161
21	.032	.028462	.034375	.032	.03175	.0310	.157
22	.028	.025347	.03125	.028	.0286	.0280	.155
23	.025	.022571	.028125	.024	.0258	.0250	.153
24	.022	.0201	.025	.022	.0230	.0225	.151
25	.020	.0179	.021875	.020	.0204	.0200	.148
26	.018	.01594	.01875	.018	.0181	.0180	.146
27	.016	.014195	.0171875	.0164	.0173	.0170	.143
28	.014	.012641	.015625	.0148	.0162	.0160	.139
29	.013	.011257	.0140625	.0136	.0150	.0150	.134
30	.012	.010025	.0125	.0124	.0140	.0140	.127
31	.010	.008928	.0109375	.0116	.0132	.0130	.120
32	.009	.00795	.01015625	.0108	.0128	.0120	.115
33	.008	.00708	.009375	.0100	.0118	.0110	.112
34	.007	.006304	.00859375	.0092	.0104	.0100	.110
35	.005	.005614	.0078125	.0084	.0095	.0095	.108
36	.004	.005	.00703125	.0076	.0090	.0090	.106
37	.....	.004453	.006640625	.0068	.....	.0085	.103
38	.....	.003965	.00625	.0060	.....	.0080	.101
39	.....	.003531	.....	.....	.....	.0075	.099
40	.....	.003144	.....	.....	.....	.0070	.097

DECIMALS OF A FOOT FOR EACH 1-64TH OF AN INCH

	0 Inch	1 Inch	2 Inches	3 Inches	4 Inches	5 Inches	6 Inches	7 Inches	8 Inches	9 Inches	10 Inches	11 Inches
	.0000	.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167
1/64	.0013	.0846	.1680	.2513	.3346	.4180	.5013	.5846	.6680	.7513	.8346	.9180
1/32	.0026	.0859	.1693	.2526	.3359	.4193	.5026	.5859	.6693	.7526	.8359	.9193
3/64	.0039	.0872	.1706	.2539	.3372	.4206	.5039	.5872	.6706	.7539	.8372	.9206
1/16	.0052	.0885	.1719	.2552	.3385	.4219	.5052	.5885	.6719	.7552	.8385	.9216
5/64	.0065	.0898	.1732	.2565	.3398	.4232	.5065	.5898	.6732	.7565	.8398	.9232
3/32	.0078	.0911	.1745	.2578	.3411	.4245	.5078	.5911	.6745	.7578	.8411	.9245
7/64	.0091	.0924	.1758	.2591	.3424	.4258	.5091	.5924	.6758	.7591	.8424	.9258
1/8	.0104	.0937	.1771	.2604	.3437	.4271	.5104	.5937	.6771	.7604	.8437	.9271
9/64	.0117	.0951	.1784	.2617	.3451	.4284	.5117	.5951	.6784	.7617	.8451	.9284
5/32	.0130	.0964	.1797	.2630	.3464	.4297	.5130	.5964	.6797	.7630	.8464	.9297
11/64	.0143	.0977	.1810	.2643	.3477	.4310	.5143	.5977	.6810	.7643	.8477	.9310
3/16	.0156	.0990	.1823	.2656	.3490	.4323	.5156	.5990	.6823	.7656	.8490	.9323
13/64	.0169	.1003	.1836	.2669	.3503	.4336	.5169	.6003	.6836	.7669	.8503	.9336
7/32	.0182	.1016	.1849	.2682	.3516	.4349	.5182	.6016	.6849	.7682	.8516	.9349
15/64	.0195	.1029	.1862	.2695	.3529	.4362	.5195	.6029	.6862	.7695	.8529	.9362
1/4	.0208	.1042	.1875	.2708	.3542	.4375	.5208	.6042	.6875	.7708	.8542	.9375
17/64	.0221	.1055	.1888	.2721	.3555	.4388	.5221	.6055	.6888	.7721	.8555	.9388
9/32	.0234	.1068	.1901	.2734	.3568	.4401	.5234	.6068	.6901	.7734	.8568	.9401
19/64	.0247	.1081	.1914	.2747	.3581	.4414	.5247	.6081	.6914	.7747	.8581	.9414
5/16	.0260	.1094	.1927	.2760	.3594	.4427	.5260	.6094	.6927	.7760	.8594	.9427
21/64	.0273	.1107	.1940	.2773	.3607	.4440	.5273	.6107	.6940	.7773	.8607	.9440
11/32	.0286	.1120	.1953	.2786	.3620	.4453	.5286	.6120	.6953	.7786	.8620	.9453
23/64	.0299	.1133	.1966	.2799	.3633	.4466	.5299	.6133	.6966	.7799	.8633	.9466
3/8	.0312	.1146	.1979	.2812	.3646	.4479	.5312	.6146	.6979	.7812	.8646	.9479
25/64	.0326	.1159	.1992	.2826	.3659	.4492	.5326	.6159	.6992	.7826	.8659	.9492
13/32	.0339	.1172	.2005	.2839	.3672	.4505	.5339	.6172	.7005	.7839	.8672	.9505
27/64	.0352	.1185	.2018	.2852	.3685	.4518	.5352	.6185	.7018	.7852	.8685	.9518
7/16	.0365	.1198	.2031	.2865	.3698	.4531	.5365	.6198	.7031	.7865	.8698	.9531
29/64	.0378	.1211	.2044	.2878	.3711	.4544	.5378	.6211	.7044	.7878	.8711	.9544
15/32	.0391	.1224	.2057	.2891	.3724	.4557	.5391	.6224	.7057	.7891	.8724	.9557
31/64	.0404	.1237	.2070	.2904	.3737	.4570	.5404	.6237	.7070	.7904	.8737	.9570
1/2	.0417	.1250	.2083	.2917	.3750	.4583	.5417	.6250	.7083	.7917	.8750	.9583

DECIMALS OF A FOOT FOR EACH 1-64TH OF AN INCH

	0 Inch	1 Inch	2 Inches	3 Inches	4 Inches	5 Inches	6 Inches	7 Inches	8 Inches	9 Inches	10 Inches	11 Inches
1/64	.0000	.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167
1/32	.0026	.0859	.1693	.2526	.3359	.4193	.5026	.5859	.6693	.7526	.8359	.9193
3/64	.0052	.0885	.1719	.2552	.3385	.4219	.5052	.5885	.6719	.7552	.8385	.9219
1/16	.0078	.0911	.1745	.2578	.3411	.4245	.5078	.5911	.6745	.7578	.8411	.9245
5/64	.0104	.0938	.1771	.2604	.3438	.4271	.5104	.5938	.6771	.7604	.8438	.9271
3/32	.0130	.0964	.1797	.2630	.3464	.4297	.5130	.5964	.6797	.7630	.8464	.9297
7/64	.0156	.0990	.1823	.2656	.3490	.4323	.5156	.5990	.6823	.7656	.8490	.9323
1/8	.0182	.1016	.1849	.2682	.3516	.4349	.5182	.6016	.6849	.7682	.8516	.9349
9/64	.0208	.1042	.1875	.2708	.3542	.4375	.5208	.6042	.6875	.7708	.8542	.9375
5/32	.0234	.1068	.1901	.2734	.3568	.4401	.5234	.6068	.6901	.7734	.8568	.9401
11/64	.0260	.1094	.1927	.2760	.3594	.4427	.5260	.6094	.6927	.7760	.8594	.9427
3/16	.0286	.1120	.1953	.2786	.3620	.4453	.5286	.6120	.6953	.7786	.8620	.9453
13/64	.0313	.1146	.1979	.2813	.3646	.4479	.5313	.6146	.6979	.7813	.8646	.9479
7/32	.0339	.1172	.2005	.2839	.3672	.4505	.5339	.6172	.7005	.7839	.8672	.9505
15/64	.0365	.1198	.2031	.2865	.3698	.4531	.5365	.6198	.7031	.7865	.8698	.9531
1/4	.0391	.1224	.2057	.2891	.3724	.4557	.5391	.6224	.7057	.7891	.8724	.9557
17/64	.0417	.1250	.2083	.2917	.3750	.4583	.5417	.6250	.7083	.7917	.8750	.9583
9/32	.0443	.1276	.2109	.2943	.3776	.4609	.5443	.6276	.7109	.7943	.8776	.9609
19/64	.0469	.1302	.2135	.2969	.3802	.4635	.5469	.6302	.7135	.7969	.8802	.9635
5/16	.0495	.1328	.2161	.2995	.3828	.4661	.5495	.6328	.7161	.7995	.8828	.9661
21/64	.0521	.1354	.2188	.3021	.3854	.4688	.5521	.6354	.7188	.8021	.8854	.9688
11/32	.0547	.1380	.2214	.3047	.3880	.4714	.5547	.6380	.7214	.8047	.8880	.9714
23/64	.0573	.1406	.2240	.3073	.3906	.4740	.5573	.6406	.7240	.8073	.8906	.9740
3/8	.0599	.1432	.2266	.3099	.3932	.4766	.5599	.6432	.7266	.8099	.8932	.9766
25/64	.0625	.1458	.2292	.3125	.3958	.4792	.5625	.6458	.7292	.8125	.8958	.9792
13/32	.0651	.1484	.2318	.3151	.3984	.4818	.5651	.6484	.7318	.8151	.8984	.9818
27/64	.0677	.1510	.2344	.3177	.4010	.4844	.5677	.6510	.7344	.8177	.9010	.9844
7/16	.0703	.1536	.2370	.3203	.4036	.4870	.5703	.6536	.7370	.8203	.9036	.9870
29/64	.0729	.1562	.2396	.3229	.4062	.4896	.5729	.6562	.7396	.8229	.9062	.9896
15/32	.0755	.1589	.2422	.3255	.4089	.4922	.5755	.6589	.7422	.8255	.9089	.9922
31/64	.0781	.1615	.2448	.3281	.4115	.4948	.5781	.6615	.7448	.8281	.9115	.9948
1/2	.0807	.1641	.2474	.3307	.4141	.4974	.5807	.6641	.7474	.8307	.9141	.9974
33/64	.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167	1.0000
17/32	.0859	.1693	.2526	.3359	.4193	.5026	.5859	.6693	.7526	.8359	.9193	
35/64	.0885	.1719	.2552	.3385	.4219	.5052	.5885	.6719	.7552	.8385	.9219	
9/16	.0911	.1745	.2578	.3411	.4245	.5078	.5911	.6745	.7578	.8411	.9245	
37/64	.0938	.1771	.2604	.3438	.4271	.5104	.5938	.6771	.7604	.8438	.9271	
19/32	.0964	.1797	.2630	.3464	.4297	.5130	.5964	.6797	.7630	.8464	.9297	
39/64	.0990	.1823	.2656	.3490	.4323	.5156	.5990	.6823	.7656	.8490	.9323	
5/8	.1016	.1849	.2682	.3516	.4349	.5182	.6016	.6849	.7682	.8516	.9349	
41/64	.1042	.1875	.2708	.3542	.4375	.5208	.6042	.6875	.7708	.8542	.9375	
21/32	.1068	.1901	.2734	.3568	.4401	.5234	.6068	.6901	.7734	.8568	.9401	
43/64	.1094	.1927	.2760	.3594	.4427	.5260	.6094	.6927	.7760	.8594	.9427	
11/16	.1120	.1953	.2786	.3620	.4453	.5286	.6120	.6953	.7786	.8620	.9453	
45/64	.1146	.1979	.2813	.3646	.4479	.5313	.6146	.6979	.7813	.8646	.9479	
23/32	.1172	.2005	.2839	.3672	.4505	.5339	.6172	.7005	.7839	.8672	.9505	
47/64	.1198	.2031	.2865	.3698	.4531	.5365	.6198	.7031	.7865	.8698	.9531	
3/4	.1224	.2057	.2891	.3724	.4557	.5391	.6224	.7057	.7891	.8724	.9557	
49/64	.1250	.2083	.2917	.3750	.4583	.5417	.6250	.7083	.7917	.8750	.9583	
25/32	.1276	.2109	.2943	.3776	.4609	.5443	.6276	.7109	.7943	.8776	.9609	
51/64	.1302	.2135	.2969	.3802	.4635	.5469	.6302	.7135	.7969	.8802	.9635	
13/16	.1328	.2161	.2995	.3828	.4661	.5495	.6328	.7161	.7995	.8828	.9661	
53/64	.1354	.2188	.3021	.3854	.4688	.5521	.6354	.7188	.8021	.8854	.9688	
27/32	.1380	.2214	.3047	.3880	.4714	.5547	.6380	.7214	.8047	.8880	.9714	
55/64	.1406	.2240	.3073	.3906	.4740	.5573	.6406	.7240	.8073	.8906	.9740	
7/8	.1432	.2266	.3099	.3932	.4766	.5599	.6432	.7266	.8099	.8932	.9766	
57/64	.1458	.2292	.3125	.3958	.4792	.5625	.6458	.7292	.8125	.8958	.9792	
29/32	.1484	.2318	.3151	.3984	.4818	.5651	.6484	.7318	.8151	.8984	.9818	
59/64	.1510	.2344	.3177	.4010	.4844	.5677	.6510	.7344	.8177	.9010	.9844	
15/16	.1536	.2370	.3203	.4036	.4870	.5703	.6536	.7370	.8203	.9036	.9870	
61/64	.1562	.2396	.3229	.4062	.4896	.5729	.6562	.7396	.8229	.9062	.9896	
31/32	.1589	.2422	.3255	.4089	.4922	.5755	.6589	.7422	.8255	.9089	.9922	
63/64	.1615	.2448	.3281	.4115	.4948	.5781	.6615	.7448	.8281	.9115	.9948	
1	.1641	.2474	.3307	.4141	.4974	.5807	.6641	.7474	.8307	.9141	.9974	

DECIMALS OF AN INCH FOR EACH 1-64TH

32nds	64ths	Decimal	Fraction	32nds	64ths	Decimal	Fraction
	1	.015625			33	.515625	
1	2	.03125		17	34	.53125	
	3	.046875			35	.546875	
2	4	.0625	1/16	18	36	.5625	9/16
	5	.078125			37	.578125	
3	6	.09375		19	38	.59375	
	7	.109375			39	.609375	
4	8	.125	1/8	20	40	.625	5/8
	9	.140625			41	.640625	
5	10	.15625		21	42	.65625	
	11	.171875			43	.671875	
6	12	.1875	3/16	22	44	.6875	11/16
	13	.203125			45	.703125	
7	14	.21875		23	46	.71875	
	15	.234375			47	.734375	
8	16	.25	1/4	24	48	.75	3/4
	17	.265625			49	.765625	
9	18	.28125		25	50	.78125	
	19	.296875			51	.796875	
10	20	.3125	5/16	26	52	.8125	13/16
	21	.328125			53	.828125	
11	22	.34375		27	54	.84375	
	23	.359375			55	.859375	
12	24	.375	3/8	28	56	.875	7/8
	25	.390625			57	.890625	
13	26	.40625		29	58	.90625	
	27	.421875			59	.921875	
14	28	.4375	7/16	30	60	.9375	15/16
	29	.453125			61	.953125	
15	30	.46875		31	62	.96875	
	31	.484375			63	.984375	
16	32	.5	1/2	32	64	1.	1

CIRCUMFERENCES AND AREAS OF CIRCLES

ADVANCING BY EIGHTHS

Diam.	Circum.	Area	Diam.	Circum.	Area	Diam.	Circum.	Area
1/64	.04909	.00019	2 5/8	8.2467	5.4119	6 3/4	21.206	35.785
1/32	.09818	.00077	2 11/16	8.4430	5.6727	6 7/8	21.598	37.122
3/64	.14726	.00173	2 3/4	8.6394	5.9396			
1/16	.19635	.00307	2 13/16	8.8357	6.2126	7	21.991	38.485
5/64	.29452	.00690	2 7/8	9.0321	6.4918	7 1/8	22.384	39.871
3/32	.39270	.01227	2 15/16	9.2284	6.7771	7 1/4	22.776	41.282
7/64	.49087	.01917	3	9.4248	7.0686	7 3/8	23.169	42.718
1/8	.58905	.02761	3 1/16	9.6211	7.3662	7 1/2	23.562	44.179
9/64	.68722	.03758	3 1/8	9.8175	7.6699	7 5/8	23.955	45.664
1/4	.78540	.04909	3 3/16	10.014	7.9798	7 3/4	24.347	47.173
5/16	.88357	.06213	3 1/4	10.210	8.2958	7 7/8	24.740	48.707
11/64	.98175	.07670	3 5/16	10.407	8.6179	8	25.133	50.265
3/8	1.0799	.09281	3 3/8	10.603	8.9462	8 1/8	25.525	51.849
13/64	1.1781	.11045	3 7/16	10.799	9.2806	8 1/4	25.918	53.456
7/16	1.2763	.12962	3 1/2	10.996	9.6211	8 3/8	26.311	55.088
15/64	1.3744	.15033	3 9/16	11.192	9.9678	8 1/2	26.704	56.745
1/2	1.4726	.17257	3 5/8	11.388	10.321	8 5/8	27.096	58.426
			3 11/16	11.585	10.680	8 3/4	27.489	60.132
17/32	1.5708	.19635	3 3/4	11.781	11.045	8 7/8	27.882	61.862
9/16	1.6690	.22166	3 13/16	11.977	11.416			
19/32	1.7671	.24850	3 7/8	12.174	11.793	9	28.274	63.617
5/8	1.8653	.27688	3 15/16	12.370	12.177	9 1/8	28.667	65.397
21/32	1.9635	.30680	4	12.566	12.566	9 1/4	29.060	67.201
11/16	2.0617	.33824	4 1/16	12.763	12.962	9 3/8	29.452	69.029
23/32	2.1598	.37122	4 1/8	12.959	13.364	9 1/2	29.845	70.882
3/4	2.2580	.40574	4 3/16	13.155	13.772	9 5/8	30.238	72.760
			4 1/4	13.352	14.186	9 3/4	30.631	74.662
25/32	2.3562	.44179	4 5/16	13.548	14.607	9 7/8	31.023	76.589
13/16	2.4544	.47937	4 3/8	13.744	15.033			
27/32	2.5525	.51849	4 7/16	13.941	15.466	10	31.416	78.540
7/8	2.6507	.55914	4 1/2	14.137	15.904	10 1/8	31.809	80.516
29/32	2.7489	.60132	4 9/16	14.334	16.349	10 1/4	32.201	82.516
15/16	2.8471	.64504	4 5/8	14.530	16.800	10 3/8	32.594	84.541
31/32	2.9452	.69029	4 11/16	14.726	17.257	10 1/2	32.987	86.590
1	3.0434	.73708	4 3/4	14.923	17.721	10 5/8	33.379	88.664
			4 13/16	15.119	18.190	10 3/4	33.772	90.763
1 1/16	3.1416	.7854	4 7/8	15.315	18.665	10 7/8	34.165	92.886
1 1/8	3.3379	.8866	4 15/16	15.512	19.147			
1 3/16	3.5343	.9940				11	34.558	95.033
1 1/4	3.7306	1.1075	5	15.708	19.635	11 1/8	34.950	97.205
1 5/16	3.9270	1.2272	5 1/16	15.904	20.129	11 1/4	35.343	99.402
1 3/8	4.1233	1.3530	5 1/8	16.101	20.629	11 3/8	35.736	101.62
1 7/16	4.3197	1.4849	5 3/16	16.297	21.135	11 1/2	36.128	103.87
1 1/2	4.5160	1.6230	5 1/4	16.493	21.648	11 5/8	36.521	106.14
1 9/16	4.7124	1.7671	5 5/16	16.690	22.166	11 3/4	36.914	108.43
1 5/8	4.9087	1.9175	5 3/8	16.886	22.691	11 7/8	37.306	110.75
1 11/16	5.1051	2.0739	5 7/16	17.082	23.221			
1 3/4	5.3014	2.2365	5 1/2	17.279	23.758	12	37.699	113.10
1 13/16	5.4978	2.4053	5 9/16	17.475	24.301	12 1/8	38.092	115.47
1 7/8	5.6941	2.5802	5 5/8	17.671	24.850	12 1/4	38.485	117.86
1 15/16	5.8905	2.7612	5 11/16	17.868	25.406	12 3/8	38.877	120.28
			5 3/4	18.064	25.967	12 1/2	39.270	122.72
2	6.0868	2.9483	5 13/16	18.261	26.535	12 5/8	39.663	125.19
2 1/16	6.2832	3.1416	5 7/8	18.457	27.109	12 3/4	40.055	127.68
2 1/8	6.4795	3.3410	5 15/16	18.653	27.688	12 7/8	40.448	130.19
2 3/16	6.6759	3.5466						
2 1/4	6.8722	3.7583	6	18.850	28.274	13	40.841	132.73
2 5/16	7.0686	3.9761	6 1/8	19.242	29.465	13 1/8	41.233	135.30
2 3/8	7.2649	4.2000	6 1/4	19.635	30.680	13 1/4	41.626	137.89
2 7/16	7.4613	4.4301	6 3/8	20.028	31.919	13 3/8	42.019	140.50
2 1/2	7.6576	4.6664	6 1/2	20.420	33.183	13 1/2	42.412	143.14
2 9/16	7.8540	4.9087	6 5/8	20.813	34.472	13 3/4	42.804	145.80
2 5/8	8.0503	5.1572				13 7/8	43.197	148.49
							43.590	151.20

CIRCUMFERENCES AND AREAS OF CIRCLES

CONTINUED

Diam.	Circum.	Area	Diam.	Circum.	Area	Diam.	Circum.	Area
14	43.982	153.94	21 3/8	67.152	358.84	28 1/4	90.321	649.18
14 1/8	44.375	156.70	21 1/2	67.544	363.05	28 3/8	90.713	654.84
14 1/4	44.768	159.48	21 5/8	67.937	367.28			
14 3/8	45.160	162.30	21 3/4	68.330	371.54	29	91.106	660.52
14 1/2	45.553	165.13	21 7/8	68.722	375.83	29 1/8	91.499	666.23
14 5/8	45.946	167.99	22	69.115	380.13	29 1/4	91.892	671.96
14 3/4	46.338	170.87	22 1/8	69.508	384.46	29 3/8	92.284	677.71
14 7/8	46.731	173.78	22 1/4	69.900	388.82	29 1/2	92.677	683.49
15	47.124	176.71	22 3/8	70.293	393.20	29 5/8	93.070	689.30
15 1/8	47.517	179.67	22 1/2	70.686	397.61	29 3/4	93.462	695.13
15 1/4	47.909	182.65	22 5/8	71.079	402.04	29 7/8	93.855	700.98
15 3/8	48.302	185.66	22 3/4	71.471	406.49	30	94.248	706.86
15 1/2	48.695	188.69	22 7/8	71.864	410.97	30 1/8	94.640	712.70
15 5/8	49.087	191.75	23	72.257	415.48	30 1/4	95.033	718.69
15 3/4	49.480	194.83	23 1/8	72.649	420.00	30 3/8	95.426	724.64
15 7/8	49.873	197.93	23 1/4	73.042	424.56	30 1/2	95.819	730.62
16	50.265	201.06	23 3/8	73.435	429.13	30 5/8	96.211	736.62
16 1/8	50.658	204.22	23 1/2	73.827	433.74	30 3/4	96.604	742.64
16 1/4	51.051	207.39	23 5/8	74.220	438.36	30 7/8	96.997	748.69
16 3/8	51.444	210.60	23 3/4	74.613	443.01	31	97.389	754.77
16 1/2	51.836	213.82	23 7/8	75.006	447.69	31 1/8	97.782	760.87
16 5/8	52.229	217.08	24	75.398	452.39	31 1/4	98.175	766.99
16 3/4	52.622	220.35	24 1/8	75.791	457.11	31 3/8	98.567	773.14
16 7/8	53.014	223.65	24 1/4	76.184	461.86	31 1/2	98.960	779.31
17	53.407	226.98	24 3/8	76.576	466.64	31 5/8	99.353	785.51
17 1/8	53.800	230.33	24 1/2	76.969	471.44	31 3/4	99.746	791.73
17 1/4	54.192	233.71	24 5/8	77.362	476.26	31 7/8	100.138	797.98
17 3/8	54.585	237.10	24 3/4	77.754	481.11	32	100.531	804.25
17 1/2	54.978	240.53	24 7/8	78.147	485.98	32 1/8	100.924	810.54
17 5/8	55.371	243.98	25	78.540	490.87	32 1/4	101.316	816.86
17 3/4	55.763	247.45	25 1/8	78.933	495.79	32 3/8	101.709	823.21
17 7/8	56.156	250.95	25 1/4	79.325	500.74	32 1/2	102.102	829.58
18	56.549	254.47	25 3/8	79.718	505.71	32 5/8	102.494	835.97
18 1/8	56.941	258.02	25 1/2	80.111	510.71	32 3/4	102.887	842.39
18 1/4	57.334	261.59	25 5/8	80.503	515.72	32 7/8	103.280	848.83
18 3/8	57.727	265.18	25 3/4	80.896	520.77	33	103.673	855.30
18 1/2	58.119	268.80	25 7/8	81.289	525.84	33 1/8	104.065	861.79
18 5/8	58.512	272.45	26	81.681	530.93	33 1/4	104.458	868.31
18 3/4	58.905	276.12	26 1/8	82.074	536.05	33 3/8	104.851	874.85
18 7/8	59.298	279.81	26 1/4	82.467	541.19	33 1/2	105.243	881.41
19	59.690	283.53	26 3/8	82.860	546.35	33 5/8	105.636	888.00
19 1/8	60.083	287.27	26 1/2	83.252	551.55	33 3/4	106.029	894.62
19 1/4	60.476	291.04	26 5/8	83.645	556.76	33 7/8	106.421	901.26
19 3/8	60.868	294.83	26 3/4	84.038	562.00	34	106.814	907.92
19 1/2	61.261	298.65	26 7/8	84.430	567.27	34 1/8	107.207	914.61
19 5/8	61.654	302.49	27	84.823	572.56	34 1/4	107.600	921.32
19 3/4	62.046	306.35	27 1/8	85.216	577.87	34 3/8	107.992	928.06
19 7/8	62.439	310.24	27 1/4	85.608	583.21	34 1/2	108.385	934.82
20	62.832	314.16	27 3/8	86.001	588.57	34 5/8	108.778	941.61
20 1/8	63.225	318.10	27 1/2	86.394	593.96	34 3/4	109.170	948.42
20 1/4	63.617	322.06	27 5/8	86.786	599.37	34 7/8	109.563	955.25
20 3/8	64.010	326.05	27 3/4	87.179	604.81	35	109.956	962.11
20 1/2	64.403	330.06	27 7/8	87.572	610.27	35 1/8	110.348	969.00
20 5/8	64.795	334.10	28	87.965	615.75	35 1/4	110.741	975.91
20 3/4	65.188	338.16	28 1/8	88.357	621.26	35 3/8	111.134	982.84
20 7/8	65.581	342.25	28 1/4	88.750	626.80	35 1/2	111.527	989.80
21	65.973	346.36	28 3/8	89.143	632.36	35 5/8	111.919	996.87
21 1/8	66.366	350.50	28 1/2	89.535	637.94	35 3/4	112.312	1003.8
21 1/4	66.759	354.66	28 5/8	89.928	643.55	35 7/8	112.705	1010.8

CIRCUMFERENCES AND AREAS OF CIRCLES
CONTINUED

Diam.	Circum.	Area	Diam.	Circum.	Area	Diam.	Circum.	Area
36	113.097	1017.9	43¼	135.874	1469.1	50½	158.650	2003.0
36⅛	113.490	1025.0	43⅜	136.267	1477.6	50⅝	159.043	2012.9
36¼	113.883	1032.1	43½	136.659	1486.2	50¾	159.436	2022.8
36⅜	114.275	1039.2	43⅝	137.052	1494.7	50⅞	159.829	2032.8
36½	114.668	1046.3	43¾	137.445	1503.3	51	160.221	2042.8
36⅝	115.061	1053.5	43⅞	137.837	1511.9	51⅛	160.614	2052.8
36¾	115.454	1060.7	44	138.230	1520.5	51¼	161.007	2062.9
36⅞	115.846	1068.0	44⅛	138.623	1529.2	51⅜	161.399	2073.0
37	116.239	1075.2	44¼	139.015	1537.9	51½	161.792	2083.1
37⅛	116.632	1082.5	44⅜	139.408	1546.6	51⅝	162.185	2093.2
37¼	117.024	1089.8	44½	139.801	1555.3	51¾	162.577	2103.3
37⅜	117.417	1097.1	44⅝	140.194	1564.0	51⅞	162.970	2113.5
37½	117.810	1104.5	44¾	140.586	1572.8	52	163.363	2123.7
37⅝	118.202	1111.8	44⅞	140.979	1581.6	52⅛	163.756	2133.9
37¾	118.596	1119.2	45	141.372	1590.4	52¼	164.148	2144.2
37⅞	118.988	1126.7	45⅛	141.764	1599.3	52⅜	164.541	2154.5
38	119.381	1134.1	45¼	142.157	1608.2	52½	164.934	2164.8
38⅛	119.773	1141.0	45⅜	142.550	1617.0	52⅝	165.326	2175.1
38¼	120.166	1149.1	45½	142.942	1626.0	52¾	165.719	2185.4
38⅜	120.559	1156.6	45⅝	143.335	1634.9	52⅞	166.112	2195.8
38½	120.951	1164.2	45¾	143.728	1643.9	53	166.504	2206.2
38⅝	121.344	1171.7	45⅞	144.121	1652.9	53⅛	166.897	2216.6
38¾	121.737	1179.3	46	144.513	1661.9	53¼	167.290	2227.0
38⅞	122.129	1186.9	46⅛	144.906	1670.9	53⅜	167.683	2237.5
39	122.522	1194.6	46¼	145.299	1680.0	53½	168.075	2248.0
39⅛	122.915	1202.3	46⅜	145.691	1689.1	53⅝	168.468	2258.5
39¼	123.308	1210.0	46½	146.084	1698.2	53¾	168.861	2269.1
39⅜	123.700	1217.7	46⅝	146.477	1707.4	53⅞	169.253	2279.6
39½	124.093	1225.4	46¾	146.869	1716.5	54	169.646	2290.2
39⅝	124.486	1233.2	46⅞	147.262	1725.7	54⅛	170.039	2300.8
39¾	124.878	1241.0	47	147.655	1734.9	54¼	170.431	2311.5
39⅞	125.271	1248.8	47⅛	148.048	1744.2	54⅜	170.824	2322.1
40	125.664	1256.6	47¼	148.440	1753.5	54½	171.217	2332.8
40⅛	126.056	1264.5	47⅜	148.833	1762.7	54⅝	171.609	2343.5
40¼	126.449	1272.4	47½	149.226	1772.1	54¾	172.002	2354.3
40⅜	126.842	1280.3	47⅝	149.618	1781.4	54⅞	172.395	2365.0
40½	127.235	1288.2	47¾	150.011	1790.8	55	172.788	2375.8
40⅝	127.627	1296.2	47⅞	150.404	1800.1	55⅛	173.180	2386.6
40¾	128.020	1304.2	48	150.796	1809.6	55¼	173.573	2397.5
40⅞	128.413	1312.2	48⅛	151.189	1819.0	55⅜	173.966	2408.3
41	128.805	1320.3	48¼	151.582	1828.5	55½	174.358	2419.2
41⅛	129.198	1328.3	48⅜	151.975	1837.9	55⅝	174.751	2430.1
41¼	129.591	1336.4	48½	152.367	1847.5	55¾	175.144	2441.1
41⅜	129.983	1344.5	48⅝	152.760	1857.0	55⅞	175.536	2452.0
41½	130.376	1352.7	48¾	153.153	1866.5	56	175.929	2463.0
41⅝	130.769	1360.8	48⅞	153.545	1876.1	56⅛	176.322	2474.0
41¾	131.161	1369.0	49	153.938	1885.7	56¼	176.715	2485.0
41⅞	131.554	1377.2	49⅛	154.331	1895.4	56⅜	177.107	2496.1
42	131.947	1385.4	49¼	154.723	1905.0	56½	177.500	2507.2
42⅛	132.340	1393.7	49⅜	155.116	1914.7	56⅝	177.893	2518.3
42¼	132.732	1402.0	49½	155.509	1924.4	56¾	178.285	2529.4
42⅜	133.125	1410.3	49⅝	155.902	1934.2	56⅞	178.678	2540.6
42½	133.518	1418.6	49¾	156.294	1943.9	57	179.071	2551.8
42⅝	133.910	1427.0	49⅞	156.687	1953.7	57⅛	179.463	2563.0
42¾	134.303	1435.4	50	157.080	1963.5	57¼	179.856	2574.2
42⅞	134.696	1443.8	50⅛	157.472	1973.3	57⅜	180.249	2585.4
43	135.088	1452.2	50¼	157.865	1983.2	57½	180.642	2596.7
43⅛	135.481	1460.7	50⅜	158.258	1993.1	57⅝	181.034	2608.0

CIRCUMFERENCES AND AREAS OF CIRCLES

CONTINUED

Diam.	Circum.	Area	Diam.	Circum.	Area	Diam.	Circum.	Area
57¾	181.427	2619.4	65	204.204	3318.3	72¼	226.980	4099.8
57⅞	181.820	2630.7	65⅛	204.596	3331.1	72⅜	227.373	4114.0
58	182.212	2642.1	65¼	204.989	3343.9	72½	227.765	4128.2
58⅛	182.605	2653.5	65⅜	205.382	3356.7	72⅝	228.158	4142.5
58¼	182.998	2664.9	65½	205.774	3369.6	72¾	228.551	4156.8
58⅜	183.390	2676.4	65⅝	206.167	3382.4	72⅞	228.944	4171.1
58½	183.783	2687.8	65¾	206.560	3395.3	73	229.336	4185.4
58⅝	184.176	2699.3	65⅞	206.952	3408.2	73⅛	229.729	4199.7
58¾	184.569	2710.9	66	207.345	3421.2	73¼	230.122	4214.1
58⅞	184.961	2722.4	66⅛	207.738	3434.2	73⅜	230.514	4228.5
59	185.354	2734.0	66¼	208.131	3447.2	73½	230.907	4242.9
59⅛	185.747	2745.6	66⅜	208.523	3460.2	73⅝	231.300	4257.4
59¼	186.139	2757.2	66½	208.916	3473.2	73¾	231.692	4271.8
59⅜	186.532	2768.8	66⅝	209.309	3486.3	73⅞	232.085	4286.3
59½	186.925	2780.5	66¾	209.701	3499.4	74	232.478	4300.8
59⅝	187.317	2792.2	66⅞	210.094	3512.5	74⅛	232.871	4315.4
59¾	187.710	2803.9	67	210.487	3525.7	74¼	233.263	4329.9
59⅞	188.103	2815.7	67⅛	210.879	3538.8	74⅜	233.656	4344.5
60	188.496	2827.4	67¼	211.272	3552.0	74½	234.049	4359.2
60⅛	188.888	2839.2	67⅜	211.635	3565.2	74⅝	234.441	4373.8
60¼	189.281	2851.0	67½	212.058	3578.5	74¾	234.834	4388.5
60⅜	189.674	2862.9	67⅝	212.450	3591.7	74⅞	235.227	4403.1
60½	190.006	2874.8	67¾	212.843	3605.0	75	235.619	4417.9
60⅝	190.459	2886.6	67⅞	213.236	3618.3	75⅛	236.012	4432.6
60¾	190.852	2898.6	68	213.628	3631.7	75¼	236.405	4447.4
60⅞	191.244	2910.5	68⅛	214.021	3645.0	75⅜	236.798	4462.2
61	191.637	2922 5	68¼	214.414	3658.4	75½	237.190	4477.0
61⅛	192.030	2934.5	68⅜	214.806	3671.8	75⅝	237.583	4491.8
61¼	192.423	2946.5	68½	215.199	3685.3	75¾	237.976	4506.7
61⅜	192.815	2958.5	68⅝	215.592	3698.7	75⅞	238.368	4521.5
61½	193.208	2970.6	68¾	125.984	3712.2	76	238.761	4536.5
61⅝	193.601	2982.7	68⅞	216.377	3725.7	76⅛	239.154	4551.4
61¾	193.993	2994.8	69	216.770	3739.3	76¼	239.546	4566.4
61⅞	194.386	3006.9	69⅛	217.163	3752.8	76⅜	239.939	4581.3
62	194.779	3019.1	69¼	217.555	3766.4	76½	240.332	4596.3
62⅛	195.171	2031.3	69⅜	217.948	3780.0	76⅝	240.725	4611.4
62¼	195.564	3043.5	69½	218.341	3793.7	76¾	241.117	4626.4
62⅜	195.957	3065.7	69⅝	218.733	3807.3	76⅞	241.510	4641.5
62½	196.350	3068.0	69¾	219.126	3821.0	77	241.903	4656.6
62⅝	196.742	3080.3	69⅞	219.519	3834.7	77⅛	242.295	4671.8
62¾	197.135	3092.6	70	219.911	3848.5	77¼	242.688	4686.9
62⅞	197.528	3104.9	70⅛	220.304	3862.2	77⅜	243.081	4702.1
63	197.920	3117.2	70¼	220.697	3876.0	77½	243.473	4717.3
63⅛	198.313	3129.6	70⅜	221.090	3889.8	77⅝	243.866	4732.5
63¼	198.706	3142.0	70½	221.482	3903.6	77¾	244.259	4747.8
63⅜	199.098	3154.5	70⅝	221.875	3917.5	77⅞	244.652	4763.1
63½	199.491	3166.9	70¾	222.268	3931.4	78	245.044	4778.4
63⅝	199.884	3179.4	70⅞	222.660	3945.3	78⅛	245.437	4793.7
63¾	200.277	3191.9	71	223.053	3959.2	78¼	245.830	4809.0
63⅞	200.669	3204.4	71⅛	223.446	3973.1	78⅜	246.222	4824.4
64	201.062	3217.0	71¼	223.838	3987.1	78½	246.615	4839.8
64⅛	201.455	3229.6	71⅜	224.231	4001.1	78⅝	247.008	4855.2
64¼	201.847	3242.2	71½	224.624	4015.2	78¾	247.400	4870.7
64⅜	202.240	3254.8	71⅝	225.017	4029.2	78⅞	247.793	4886.2
64½	202.633	3267.5	71¾	225.409	4043.3	79	248.186	4901.7
64⅝	203.025	3280.1	71⅞	225.802	4057.4	79⅛	248.579	4917.2
64¾	203.418	3292.8	72	226.195	4071.5	79¼	248.971	4932.7
64⅞	203.811	3305.6	72⅛	226.587	4085.7	79⅜	249.364	4948.3

CIRCUMFERENCES AND AREAS OF CIRCLES

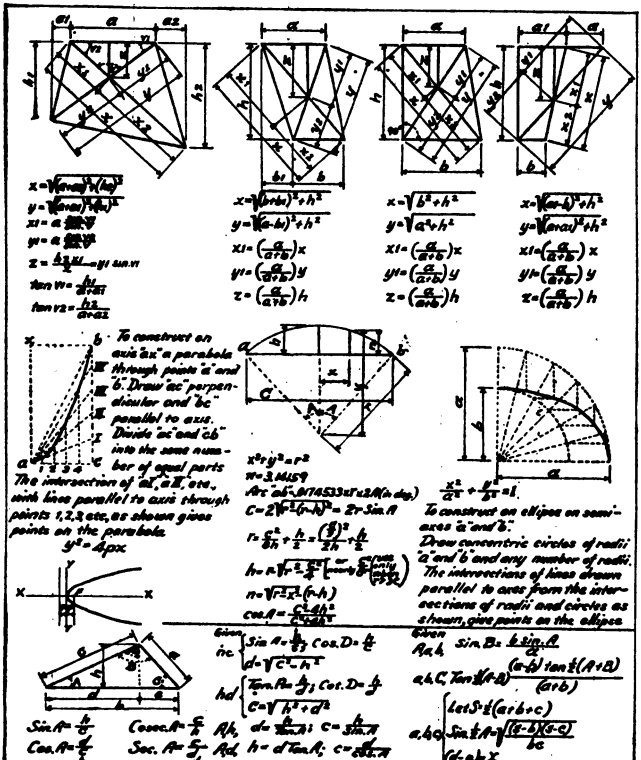
CONTINUED

Diam.	Circum.	Area	Diam.	Circum.	Area	Diam.	Circum.	Area
79 1/16	249.757	4963.9	86 3/16	271.355	5859.6	93 1/16	292.954	6839.5
79 1/8	250.149	4979.5	86 1/8	271.748	5876.5	93 1/8	293.346	6847.8
79 3/16	250.542	4995.2	86 3/16	272.140	5893.5	93 1/16	293.739	6866.1
79 1/8	250.935	5010.9	86 1/4	272.533	5910.6	93 5/16	294.132	6884.5
			86 5/16	272.926	5927.6	93 3/8	294.524	6902.9
80	251.327	5026.5				93 7/16	294.917	6921.3
80 1/16	251.720	5042.3	87	273.319	5944.7			
80 1/8	252.113	5058.0	87 1/16	273.711	5961.8	94	295.310	6939.8
80 3/16	252.506	5073.8	87 1/8	274.104	5978.9	94 1/16	295.702	6958.2
80 1/4	252.898	5089.6	87 3/16	274.497	5996.0	94 1/8	296.095	6976.7
80 5/16	253.291	5105.4	87 1/4	274.889	6013.2	94 3/16	296.488	6995.3
80 3/8	253.684	5121.2	87 5/16	275.282	6030.4	94 1/4	296.881	7013.8
80 7/16	254.076	5137.1	87 3/8	275.675	6047.6	94 5/16	297.273	7032.4
			87 7/16	276.067	6064.9	94 3/8	297.666	7051.0
81	254.469	5153.0				94 7/16	298.059	7069.6
81 1/16	254.862	5168.9	88	276.460	6082.1			
81 1/8	255.254	5184.9	88 1/16	276.853	6099.4	95	298.451	7088.2
81 3/16	255.647	5200.8	88 1/8	277.246	6116.7	95 1/16	298.844	7106.9
81 1/4	256.040	5216.8	88 3/16	277.638	6134.1	95 1/8	299.237	7125.6
81 5/16	256.433	5232.8	88 1/4	278.031	6151.4	95 3/16	299.629	7144.3
81 3/8	256.825	5248.9	88 5/16	278.424	6168.8	95 1/4	300.022	7163.0
81 7/16	257.218	5264.9	88 3/8	278.816	6186.2	95 5/16	300.415	7181.8
			88 7/16	279.209	6203.7	95 3/8	300.807	7200.6
82	257.611	5281.0				95 7/16	301.200	7219.4
82 1/16	258.003	5297.1	89	279.602	6221.1			
82 1/8	258.396	5313.3	89 1/16	279.994	6238.6	96	301.593	7238.2
82 3/16	258.789	5329.4	89 1/8	280.387	6256.1	96 1/16	301.986	7257.1
82 1/4	259.181	5345.6	89 3/16	280.780	6273.7	96 1/8	302.378	7276.0
82 5/16	259.574	5361.8	89 1/4	281.173	6291.2	96 3/16	302.771	7294.9
82 3/8	259.967	5378.1	89 5/16	281.565	6308.8	96 1/4	303.164	7313.8
82 7/16	260.359	5394.3	89 3/8	281.958	6326.4	96 5/16	303.556	7332.8
			89 7/16	282.351	6344.1	96 3/8	303.949	7351.8
83	260.752	5410.6				96 7/16	304.342	7370.8
83 1/16	261.145	5426.9	90	282.743	6361.7			
83 1/8	261.538	5443.3	90 1/16	283.136	6379.4	97	304.734	7389.8
83 3/16	261.930	5459.6	90 1/8	283.529	6397.1	97 1/16	305.127	7408.9
83 1/4	262.323	5476.0	90 3/16	283.921	6414.9	97 1/8	305.520	7428.0
83 5/16	262.716	5492.4	90 1/4	284.314	6432.6	97 3/16	305.913	7447.1
83 3/8	263.108	5508.8	90 5/16	284.707	6450.4	97 1/4	306.305	7466.2
83 7/16	263.501	5525.3	90 3/8	285.100	6468.2	97 5/16	306.698	7485.3
			90 7/16	285.492	6486.0	97 3/8	307.091	7504.5
84	263.894	5541.8				97 7/16	307.483	7523.7
84 1/16	264.286	5558.3	91	285.885	6503.9			
84 1/8	264.679	5574.8	91 1/16	286.278	6521.8	98	307.876	7543.0
84 3/16	265.072	5591.4	91 1/8	286.670	6539.7	98 1/16	308.269	7562.2
84 1/4	265.465	5607.9	91 3/16	287.063	6557.6	98 1/8	308.661	7581.5
84 5/16	265.857	5624.5	91 1/4	287.456	6575.5	98 3/16	309.054	7600.8
84 3/8	266.250	5641.2	91 5/16	287.848	6593.5	98 1/4	309.447	7620.1
84 7/16	266.643	5657.8	91 3/8	288.241	6611.5	98 5/16	309.840	7639.5
			91 7/16	288.634	6629.6	98 3/8	310.232	7658.9
85	267.035	5674.5				98 7/16	310.625	7678.3
85 1/16	267.428	5691.2	92	289.027	6647.6			
85 1/8	267.821	5707.9	92 1/16	289.419	6665.7	99	311.018	7697.7
85 3/16	268.213	5724.7	92 1/8	289.812	6683.8	99 1/16	311.410	7717.1
85 1/4	268.606	5741.5	92 3/16	290.205	6701.9	99 1/8	311.803	7736.6
85 5/16	268.999	5758.3	92 1/4	290.597	6720.1	99 3/16	312.196	7756.1
85 3/8	269.392	5775.1	92 5/16	290.990	6738.2	99 1/4	312.588	7775.6
85 7/16	269.784	5791.9	92 3/8	291.383	6756.4	99 5/16	312.981	7795.2
			92 7/16	291.775	6774.7	99 3/8	313.374	7814.8
86	270.177	5808.8				99 7/16	313.767	7834.4
86 1/16	270.570	5825.7	93	292.168	6792.9			
86 1/4	270.962	5842.6	93 1/16	292.561	6811.2	100	314.159	7854.0

USEFUL FORMULAE

DIAGRAMS SHOWING THE METHOD OF FINDING GEOMETRIC FUNCTIONS OF ANGLES, ETC.

By means of this explanation and the tables following, the reader may determine the unknowns in the figures illustrated. Tables of tangents, cotangents, sines, cosines, secants and cosecants follow.



NATURAL TANGENTS AND COTANGENTS

Degrees	TANGENT 0′	10′	20′	30′	40′	50′	60′	
0	0.00000	0.00291	0.00582	0.00873	0.01164	0.01455	0.01746	89
1	0.01746	0.02036	0.02328	0.02619	0.02910	0.03201	0.03492	88
2	0.03492	0.03783	0.04075	0.04366	0.04658	0.04949	0.05241	87
3	0.05241	0.05533	0.05824	0.06116	0.06408	0.06700	0.06993	86
4	0.06993	0.07285	0.07578	0.07870	0.08163	0.08456	0.08749	85
5	0.08749	0.09042	0.09335	0.09629	0.09923	0.10216	0.10510	84
6	0.10510	0.10805	0.11099	0.11394	0.11688	0.11983	0.12278	83
7	0.12278	0.12574	0.12869	0.13165	0.13461	0.13758	0.14054	82
8	0.14054	0.14351	0.14648	0.14945	0.15243	0.15540	0.15838	81
9	0.15838	0.16137	0.16435	0.16734	0.17033	0.17333	0.17633	80
10	0.17633	0.17933	0.18233	0.18534	0.18835	0.19136	0.19438	79
11	0.19438	0.19740	0.20042	0.20345	0.20648	0.20952	0.21256	78
12	0.21256	0.21560	0.21864	0.22169	0.22475	0.22781	0.23087	77
13	0.23087	0.23393	0.23700	0.24008	0.24316	0.24624	0.24933	76
14	0.24933	0.25242	0.25552	0.25862	0.26172	0.26483	0.26795	75
15	0.26795	0.27107	0.27419	0.27732	0.28046	0.28360	0.28675	74
16	0.28675	0.28990	0.29305	0.29621	0.29938	0.30255	0.30573	73
17	0.30573	0.30891	0.31210	0.31530	0.31850	0.32171	0.32492	72
18	0.32492	0.32814	0.33136	0.33460	0.33783	0.34108	0.34433	71
19	0.34433	0.34758	0.35085	0.35412	0.35740	0.36068	0.36397	70
20	0.36397	0.36727	0.37057	0.37388	0.37720	0.38053	0.38386	69
21	0.38386	0.38721	0.39055	0.39391	0.39727	0.40065	0.40403	68
22	0.40403	0.40741	0.41081	0.41421	0.41763	0.42105	0.42447	67
23	0.42447	0.42791	0.43136	0.43481	0.43828	0.44175	0.44523	66
24	0.44523	0.44872	0.45222	0.45573	0.45924	0.46277	0.46631	65
25	0.46631	0.46985	0.47341	0.47698	0.48055	0.48414	0.48773	64
26	0.48773	0.49134	0.49495	0.49858	0.50222	0.50587	0.50953	63
27	0.50953	0.51320	0.51688	0.52057	0.52427	0.52798	0.53171	62
28	0.53171	0.53545	0.53920	0.54296	0.54674	0.55051	0.55431	61
29	0.55431	0.55812	0.56194	0.56577	0.56962	0.57348	0.57735	60
30	0.57735	0.58124	0.58513	0.58905	0.59297	0.59691	0.60086	59
31	0.60086	0.60483	0.60881	0.61280	0.61681	0.62083	0.62487	58
32	0.62487	0.62892	0.63299	0.63707	0.64117	0.64528	0.64941	57
33	0.64941	0.65355	0.65771	0.66189	0.66608	0.67028	0.67451	56
34	0.67451	0.67875	0.68301	0.68728	0.69157	0.69588	0.70021	55
35	0.70021	0.70455	0.70891	0.71329	0.71769	0.72211	0.72654	54
36	0.72654	0.73100	0.73547	0.73996	0.74447	0.74900	0.75355	53
37	0.75355	0.75812	0.76272	0.76733	0.77196	0.77661	0.78129	52
38	0.78129	0.78598	0.79070	0.79544	0.80020	0.80498	0.80978	51
39	0.80978	0.81461	0.81946	0.82434	0.82923	0.83415	0.83910	50
40	0.83910	0.84407	0.84906	0.85408	0.85912	0.86419	0.86929	49
41	0.86929	0.87441	0.87955	0.88473	0.88992	0.89515	0.90040	48
42	0.90040	0.90569	0.91099	0.91633	0.92170	0.92709	0.93252	47
43	0.93252	0.93797	0.94345	0.94896	0.95451	0.96008	0.96569	46
44	0.96569	0.97133	0.97700	0.98270	0.98843	0.99420	1.00000	45
	60′	50′	40′	30′	20′	10′	0′	Degrees
	COTANGENT							

NATURAL COTANGENTS AND TANGENTS

Degrees	COTANGENT 0′	10′	20′	30′	40′	50′	60′	
0	∞	343.77371	171.88540	114.58865	85.93979	68.75009	57.28996	89
1	57.28996	49.10388	42.96408	38.18846	34.36777	31.24158	28.63625	88
2	28.63625	26.43160	24.54176	22.90377	21.47040	20.20555	19.08114	87
3	19.08114	18.07498	17.16934	16.34986	15.60478	14.92442	14.30067	86
4	14.30067	13.72674	13.19688	12.70621	12.25051	11.82617	11.43005	85
5	11.43005	11.05943	10.71191	10.38540	10.07803	9.78817	9.51436	84
6	9.51436	9.25530	9.00983	8.77689	8.55555	8.34496	8.14435	83
7	8.14435	7.95302	7.77035	7.59575	7.42871	7.26873	7.11537	82
8	7.11537	6.96823	6.82694	6.69116	6.56055	6.43484	6.31375	81
9	6.31375	6.19703	6.08444	5.97576	5.87080	5.76937	5.67128	80
10	5.67128	5.57638	5.48451	5.39552	5.30928	5.22566	5.14455	79
11	5.14455	5.06584	4.98940	4.91516	4.84300	4.77286	4.70463	78
12	4.70463	4.63825	4.57363	4.51071	4.44942	4.38969	4.33148	77
13	4.33148	4.27471	4.21933	4.16530	4.11256	4.06107	4.01078	76
14	4.01078	3.96165	3.91364	3.86671	3.82083	3.77595	3.73205	75
15	3.73205	3.68909	3.64705	3.60588	3.56557	3.52609	3.48741	74
16	3.48741	3.44951	3.41236	3.37594	3.34023	3.30521	3.27085	73
17	3.27085	3.23714	3.20406	3.17159	3.13972	3.10842	3.07768	72
18	3.07768	3.04749	3.01783	2.98869	2.96004	2.93189	2.90421	71
19	2.90421	2.87700	2.85023	2.82391	2.79802	2.77254	2.74748	70
20	2.74748	2.72281	2.69853	2.67462	2.65109	2.62791	2.60509	69
21	2.60509	2.58261	2.56046	2.53865	2.51715	2.49597	2.47509	68
22	2.47509	2.45451	2.43422	2.41421	2.39449	2.37504	2.35585	67
23	2.35585	2.33693	2.31826	2.29984	2.28167	2.26374	2.24604	66
24	2.24604	2.22857	2.21132	2.19430	2.17749	2.16090	2.14451	65
25	2.14451	2.12832	2.11233	2.09654	2.08094	2.06553	2.05030	64
26	2.05030	2.03526	2.02039	2.00569	1.99116	1.97680	1.96261	63
27	1.96261	1.94858	1.93470	1.92098	1.90741	1.89400	1.88073	62
28	1.88073	1.86760	1.85462	1.84177	1.82907	1.81649	1.80405	61
29	1.80405	1.79174	1.77955	1.76749	1.75556	1.74375	1.73205	60
30	1.73205	1.72047	1.70901	1.69766	1.68643	1.67530	1.66428	59
31	1.66428	1.65337	1.64256	1.63185	1.62125	1.61074	1.60033	58
32	1.60033	1.59002	1.57981	1.56969	1.55966	1.54972	1.53987	57
33	1.53987	1.53010	1.52043	1.51084	1.50133	1.49190	1.48256	56
34	1.48256	1.47330	1.46411	1.45501	1.44598	1.43703	1.42815	55
35	1.42815	1.41934	1.41061	1.40195	1.39336	1.38484	1.37638	54
36	1.37638	1.36800	1.35968	1.35142	1.34323	1.33511	1.32704	53
37	1.32704	1.31904	1.31110	1.30323	1.29541	1.28764	1.27994	52
38	1.27994	1.27230	1.26471	1.25717	1.24969	1.24227	1.23490	51
39	1.23490	1.22758	1.22031	1.21310	1.20593	1.19882	1.19175	50
40	1.19175	1.18474	1.17777	1.17085	1.16398	1.15715	1.15037	49
41	1.15037	1.14363	1.13694	1.13029	1.12369	1.11713	1.11061	48
42	1.11061	1.10414	1.09770	1.09131	1.08496	1.07864	1.07237	47
43	1.07237	1.06613	1.05994	1.05378	1.04766	1.04158	1.03553	46
44	1.03553	1.02952	1.02355	1.01761	1.01170	1.00583	1.00000	45
	60′	50′	40′	30′	20′	20′	0′	Degrees
	TANGENT							

NATURAL COSINES AND SINES

Degrees	COSINE 0′	10′	20′	30′	40′	50′	60′	
0	1.00000	1.00000	0.99998	0.99996	0.99993	0.99989	0.99985	89
1	0.99985	0.99979	0.99973	0.99966	0.99958	0.99949	0.99939	88
2	0.99939	0.99929	0.99917	0.99905	0.99892	0.99878	0.99863	87
3	0.99863	0.99847	0.99831	0.99813	0.99795	0.99776	0.99756	86
4	0.99756	0.99736	0.99714	0.99692	0.99668	0.99644	0.99619	85
5	0.99619	0.99594	0.99567	0.99540	0.99511	0.99482	0.99452	84
6	0.99452	0.99421	0.99390	0.99357	0.99324	0.99290	0.99255	83
7	0.99255	0.99219	0.99182	0.99144	0.99106	0.99067	0.99027	82
8	0.99027	0.98986	0.98944	0.98902	0.98858	0.98814	0.98769	81
9	0.98769	0.98723	0.98676	0.98629	0.98580	0.98531	0.98481	80
10	0.98481	0.98430	0.98378	0.98325	0.98272	0.98218	0.98163	79
11	0.98163	0.98107	0.98050	0.97992	0.97934	0.97875	0.97815	78
12	0.97815	0.97754	0.97692	0.97630	0.97566	0.97502	0.97437	77
13	0.97437	0.97371	0.97304	0.97237	0.97169	0.97100	0.97020	76
14	0.97030	0.96959	0.96887	0.96815	0.96742	0.96667	0.96593	75
15	0.96593	0.96517	0.96440	0.96363	0.96285	0.96206	0.96126	74
16	0.96126	0.96046	0.95964	0.95882	0.95799	0.95715	0.95630	73
17	0.95630	0.95545	0.95459	0.95372	0.95284	0.95195	0.95106	72
18	0.95106	0.95015	0.94924	0.94832	0.94740	0.94646	0.94552	71
19	0.94552	0.94457	0.94361	0.94264	0.94167	0.94068	0.93969	70
20	0.93969	0.93869	0.93769	0.93667	0.93565	0.93462	0.93358	69
21	0.93358	0.93253	0.93148	0.93042	0.92935	0.92827	0.92718	68
22	0.92718	0.92609	0.92499	0.92388	0.92276	0.92164	0.92050	67
23	0.92050	0.91936	0.91822	0.91706	0.91590	0.91472	0.91355	66
24	0.91355	0.91236	0.91116	0.90996	0.90875	0.90753	0.90631	65
25	0.90631	0.90507	0.90383	0.90259	0.90133	0.90007	0.89879	64
26	0.89879	0.89752	0.89623	0.89493	0.89363	0.89232	0.89101	63
27	0.89101	0.88968	0.88835	0.88701	0.88566	0.88431	0.88295	62
28	0.88295	0.88158	0.88020	0.87882	0.87743	0.87603	0.87462	61
29	0.87462	0.87321	0.87178	0.87036	0.86892	0.86748	0.86603	60
30	0.86603	0.86457	0.86310	0.86163	0.86115	0.85866	0.85717	59
31	0.85717	0.85567	0.85416	0.85264	0.85112	0.84959	0.84805	58
32	0.84805	0.84650	0.84495	0.84339	0.84182	0.84025	0.83867	57
33	0.83867	0.83708	0.83549	0.83389	0.83228	0.83066	0.82904	56
34	0.82904	0.82741	0.82577	0.82413	0.82248	0.82082	0.81915	55
35	0.81915	0.81748	0.81580	0.81412	0.81242	0.81072	0.80902	54
36	0.80902	0.80730	0.80558	0.80386	0.80212	0.80038	0.79864	53
37	0.79864	0.79688	0.79512	0.79335	0.79158	0.78980	0.78801	52
38	0.78801	0.78622	0.78442	0.78261	0.78079	0.77897	0.77715	51
39	0.77715	0.77531	0.77347	0.77162	0.76977	0.76791	0.76604	50
40	0.76604	0.76417	0.76229	0.76041	0.75851	0.75661	0.75471	49
41	0.75471	0.75280	0.75088	0.74896	0.74703	0.74509	0.74314	48
42	0.74314	0.74120	0.73924	0.73728	0.73531	0.73333	0.73135	47
43	0.73135	0.72937	0.72737	0.72537	0.72337	0.72136	0.71934	46
44	0.71934	0.71732	0.71529	0.71325	0.71121	0.70916	0.70711	45
	60′	50′	40′	30′	20′	10′	0′	Degrees
	SINE							

NATURAL SECANTS AND COSECANTS

Degrees	SECANT 0′	10′	20′	30′	40′	50′	60′	
0	1.00000	1.00001	1.00002	1.00004	1.00007	1.00011	1.00015	89
1	1.00015	1.00021	1.00027	1.00034	1.00042	1.00051	1.00061	88
2	1.00061	1.00072	1.00083	1.00095	1.00108	1.00122	1.00137	87
3	1.00137	1.00153	1.00169	1.00187	1.00205	1.00224	1.00244	86
4	1.00244	1.00265	1.00287	1.00309	1.00333	1.00357	1.00382	85
5	1.00382	1.00408	1.00435	1.00463	1.00491	1.00521	1.00551	84
6	1.00551	1.00582	1.00614	1.00647	1.00681	1.00715	1.00751	83
7	1.00751	1.00787	1.00825	1.00863	1.00902	1.00942	1.00983	82
8	1.00983	1.01024	1.01067	1.01111	1.01155	1.01200	1.01247	81
9	1.01247	1.01294	1.01342	1.01391	1.01440	1.01491	1.01543	80
10	1.01543	1.01595	1.01649	1.01703	1.01758	1.01815	1.01872	79
11	1.01872	1.01930	1.01989	1.02049	1.02110	1.02171	1.02234	78
12	1.02234	1.02298	1.02362	1.02428	1.02494	1.02562	1.02630	77
13	1.02630	1.02700	1.02770	1.02842	1.02914	1.02987	1.03061	76
14	1.03061	1.03137	1.03213	1.03290	1.03368	1.03447	1.03528	75
15	1.03528	1.03609	1.03691	1.03774	1.03858	1.03944	1.04030	74
16	1.04030	1.04117	1.04206	1.04295	1.04385	1.04477	1.04569	73
17	1.04569	1.04663	1.04757	1.04853	1.04950	1.05047	1.05146	72
18	1.05146	1.05246	1.05347	1.05449	1.05552	1.05657	1.05762	71
19	1.05762	1.05869	1.05976	1.06085	1.06195	1.06306	1.06418	70
20	1.06418	1.06531	1.06645	1.06761	1.06878	1.06995	1.07115	69
21	1.07115	1.07235	1.07356	1.07479	1.07602	1.07727	1.07853	68
22	1.07853	1.07981	1.08109	1.08239	1.08370	1.08503	1.08636	67
23	1.08636	1.08771	1.08907	1.09044	1.09183	1.09323	1.09464	66
24	1.09464	1.09606	1.09750	1.09895	1.10041	1.10189	1.10338	65
25	1.10338	1.10488	1.10640	1.10793	1.10947	1.11103	1.11260	64
26	1.11260	1.11419	1.11579	1.11740	1.11903	1.12067	1.12233	63
27	1.12233	1.12400	1.12568	1.12738	1.12910	1.13083	1.13257	62
28	1.13257	1.13433	1.13610	1.13789	1.13970	1.14152	1.14335	61
29	1.14335	1.14521	1.14707	1.14896	1.15085	1.15277	1.15470	60
30	1.15470	1.15665	1.15861	1.16059	1.16259	1.16460	1.16663	59
31	1.16663	1.16868	1.17075	1.17283	1.17493	1.17704	1.17918	58
32	1.17918	1.18133	1.18350	1.18569	1.18790	1.19012	1.19236	57
33	1.19236	1.19463	1.19691	1.19920	1.20152	1.20386	1.20622	56
34	1.20622	1.20859	1.21099	1.21341	1.21584	1.21830	1.22077	55
35	1.22077	1.22327	1.22579	1.22833	1.23089	1.23347	1.23607	54
36	1.23607	1.23869	1.24134	1.24400	1.24669	1.24940	1.25214	53
37	1.25214	1.25489	1.25767	1.26047	1.26330	1.26615	1.26902	52
38	1.26902	1.27191	1.27483	1.27778	1.28075	1.28374	1.28676	51
39	1.28676	1.28980	1.29287	1.29597	1.29909	1.30223	1.30541	50
40	1.30541	1.30861	1.31183	1.31509	1.31837	1.32168	1.32501	49
41	1.32501	1.32838	1.33177	1.33519	1.33864	1.34212	1.34563	48
42	1.34563	1.34917	1.35274	1.35634	1.35997	1.36363	1.36733	47
43	1.36733	1.37105	1.37481	1.37860	1.38242	1.38628	1.39016	46
44	1.39016	1.39409	1.39804	1.40203	1.40606	1.41012	1.41421	45
	60′	50′	40′	30′	20′	10′	0′	Degrees
	COSECANT							

NATURAL COSECANTS AND SECANTS

Degrees	COSECANT							
	0′	10′	20′	30′	40′	50′	60′	
0	∞	343.77516	171.88831	114.59301	85.94561	68.75736	57.29869	89
1	57.29869	49.11406	42.97571	38.20155	34.38232	31.25758	28.65371	88
2	28.65371	26.45051	24.56212	22.92559	21.49368	20.23028	19.10732	87
3	19.10732	18.10262	17.19843	16.38041	15.63679	14.95788	14.33559	86
4	14.33559	13.76312	13.23472	12.74550	12.29125	11.86837	11.47371	85
5	11.47371	11.10455	10.75849	10.43343	10.12752	9.83912	9.56677	84
6	9.56677	9.30917	9.06515	8.83367	8.61379	8.46466	8.20551	83
7	8.20551	8.01565	7.83443	7.66130	7.49571	7.33719	7.18530	82
8	7.18530	7.03962	6.89979	6.76547	6.63633	6.51208	6.39245	81
9	6.39245	6.27719	6.16607	6.05886	5.95536	5.85539	5.75877	80
10	5.75877	5.66533	5.57493	5.48740	5.40263	5.32049	5.24084	79
11	5.24084	5.16359	5.08863	5.01585	4.94517	4.87649	4.80973	78
12	4.80973	4.74482	4.68166	4.62023	4.56041	4.50216	4.44541	77
13	4.44541	4.39012	4.33622	4.28366	4.23239	4.18238	4.13357	76
14	4.13357	4.08591	4.03938	3.99393	3.94952	3.90613	3.86370	75
15	3.86370	3.82223	3.78166	3.74198	3.70315	3.66515	3.62796	74
16	3.62796	3.59154	3.55587	3.52094	3.48671	3.45317	3.42030	73
17	3.42030	3.38808	3.35649	3.32551	3.29512	3.26531	3.23607	72
18	3.23607	3.20737	3.17920	3.15155	3.12440	3.09774	3.07155	71
19	3.07155	3.04584	3.02057	2.99574	2.97135	2.94737	2.92380	70
20	2.92380	2.90063	2.87785	2.85545	2.83342	2.81175	2.79043	69
21	2.79043	2.76945	2.74881	2.72850	2.70851	2.68884	2.66947	68
22	2.66947	2.65040	2.63162	2.61313	2.59491	2.57698	2.55930	67
23	2.55930	2.54190	2.52474	2.50784	2.49119	2.47477	2.45859	66
24	2.45859	2.44264	2.42692	2.41142	2.39614	2.38107	2.36620	65
25	2.36620	2.35154	2.33708	2.32282	2.30875	2.29487	2.28117	64
26	2.28117	2.26766	2.25432	2.24116	2.22817	2.21535	2.20269	63
27	2.20269	2.19019	2.17786	2.16568	2.15366	2.14178	2.13005	62
28	2.13005	2.11847	2.10704	2.09574	2.08458	2.07356	2.06267	61
29	2.06267	2.05191	2.04128	2.03077	2.02039	2.01014	2.00000	60
30	2.00000	1.98998	1.98008	1.97029	1.96062	1.95106	1.94160	59
31	1.94160	1.93226	1.92302	1.91388	1.90485	1.89591	1.88709	58
32	1.88708	1.87834	1.86990	1.86116	1.85271	1.84435	1.83608	57
33	1.83608	1.82790	1.81981	1.81180	1.80388	1.79604	1.78829	56
34	1.78829	1.78062	1.77303	1.76552	1.75808	1.75073	1.74345	55
35	1.74345	1.73624	1.72911	1.72205	1.71506	1.70815	1.70130	54
36	1.70130	1.69452	1.68782	1.68117	1.67460	1.66809	1.66164	53
37	1.66164	1.65526	1.64894	1.64268	1.63648	1.63035	1.62427	52
38	1.62427	1.61825	1.61229	1.60639	1.60054	1.59475	1.58902	51
39	1.58902	1.58333	1.57771	1.57213	1.56661	1.56114	1.55572	50
40	1.55572	1.55036	1.54504	1.53977	1.53455	1.52938	1.52425	49
41	1.52425	1.51918	1.51415	1.50916	1.50422	1.49933	1.49448	48
42	1.49448	1.48967	1.48491	1.48019	1.47551	1.47087	1.46628	47
43	1.46628	1.46173	1.45721	1.45274	1.44831	1.44391	1.43956	46
44	1.43956	1.43524	1.43096	1.42672	1.42251	1.41835	1.41421	45
	60′	50′	40′	30′	20′	10′	0′	Degrees
	SECANT							

FORGING AND HARDENING OF HIGH SPEED TOOL STEELS

FORGING OR FORMING TOOL FROM BAR

Heat uniformly to *bright* cherry red (1650° Fhr.), and not further back than necessary for forging. Form quickly to tool shape, avoiding sharp corners. After forging lay tool down until cold to relieve forging strains before hardening.

HARDENING OR SIMPLEST HEAT TREATMENT

Heat slowly, nose of tool, to cherry red (1600° Fhr.), then quickly bring cutting edge to sparkling white welding heat (2150° Fhr.). Quench in clean oil or dry cold air blast.

GRINDING OR FINISHING EDGE FOR CUTTING

Grind slowly and avoid forcing tool against grinder which blues cutting edge and causes surface seams. Fast free cutting wheel recommended.

FORGING AND HARDENING OF CARBON TOOL STEEL

FORGING OR FORMING TOOL TO SHAPE

Heat uniformly to cherry red, remembering that "the higher the carbon the lower the heat." Form tool to shape by hammering vigorously and constantly until a faint brown.

HARDENING OR SIMPLEST HEAT TREATMENT

Heat slowly and uniformly to low cherry red, about (1450° Fhr.), depending upon carbon contents of your steel. Quench in salt water until vibration ceases, then quench in oil for hard surface and tough center.

TEMPERING: INCREASING TOUGHNESS AND RELIEVING STRAINS

Temper immediately after hardening. Draw temper most suited for the work. Remembering that tempering increases elasticity, reduces brittleness and does not affect hardness.

For more complete data on treatment of steel, take it up with us and let us go into the matter thoroughly with you.

TEST FOR DETERMINING PROPER HEAT FOR HARDENING ANY CARBON STEELS

Take bar 6 inches long, nick every half inch, heat one end to very high heat, letting heat soak gradually along bar until other end reaches a low red heat. Quench in water and break at different nicks. Fine grained smooth fracture will denote proper hardening heat. Coarse open grained fracture will denote overheating.

It is important to remember for all carbon tool steels that the carbon contents and not grade or quality govern the hardening heat, and that the higher the carbon the lower the heat.

11—BUILDINGS AND BRIDGES

THESE tables are adapted principally for building construction, and in this respect differ from other published tables, which generally have been calculated for railway bridge construction, which necessitates separate calculations or deductions before they can be used for other forms of construction. The formulae used in preparing these tables are in conformity with the building laws of the City of Chicago, The American Railway Maintenance of Way Association Specifications and Specifications for Buildings as prepared by Professor C. C. Schneider, which latter are generally accepted as the most practical for building work.

Tables on Joist Anchors, Stirrups, Cast Iron Columns, Traveling Crane Clearances, etc., are published, which supply information constantly in demand by steel users and not generally found in other publications.

Safe Loads are given for standard sections which have been recently added to products of the Rolling Mills and which have never heretofore been published. It is our purpose to publish additional tables from time to time which will contain additional data of this character in advance of those obtainable from any other source.

When referring to the following tables the Trade is cautioned that they should be used only in connection with the detailed explanation accompanying the same and that we take no responsibility in connection with their use.

PAGES 1100 TO 1190

11—BUILDINGS AND BRIDGES

Page

WEIGHTS AND DIMENSIONS OF STRUCTURALS

I Beams....1101
Channels....1103
Angles....1105
Tees, Equal Leg....1107
Tees, Unequal Leg....1108
Bethlehem Girder Beams....1109
Bethlehem I Beams....1110

SAFE LOADS OF STRUCTURAL SHAPES

Explanation of Tables of Safe Loads....1111
I Beams....1112
Channels....1118
Angles, Equal Leg....1122
Angles, Unequal Leg....1124
Tees....1128
Girders, Plate....1130
Girders, Box Plate....1132
Girders, Beam Box....1134

SAFE LOADS OF COLUMNS

Explanation of Tables of Safe Loads....1139
Columns, Plate and Angle....1140

Page

Columns, Latticed Channel....1152
Columns, Plate and Channel....1154
Columns, I Beam....1168
Columns or Struts, Single Angle....1172
Columns or Struts, Double Angle....1174
Columns, Bethlehem H....1180
"Firmtread" Floor Plates....1184
Sheets, Corrugated....1184

MISCELLANEOUS

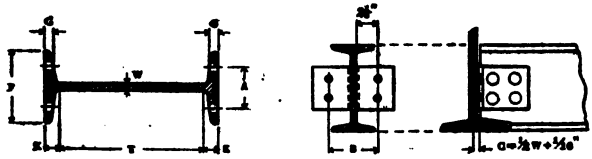
Connections, Standard for Beams and Channels....1185
Separators for Standard Beams....1186
Joist Anchors and Tie Straps....1188
Stirrups and Joist Hangers....1189
Columns, Cast Iron, Weights of....1190
Bases for Columns, Cast Iron....1192
Brackets and Lugs....1193
Cranes, Traveling....1194
Timber Stresses....1196

ASSOCIATED SUBJECTS

1100 TO 1199

Complete Alphabetical Index will be found on last four pages of the book.

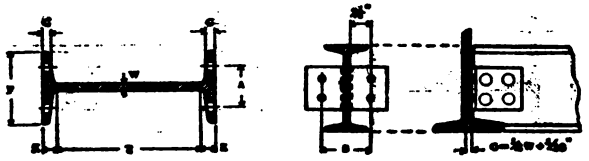
STANDARD STEEL I BEAMS



WEIGHTS AND DIMENSIONS

Depth of Beam, Inches	Weight per Foot, Pounds	Dimensions, in Inches								Maximum Rivet or Bolt, Inch
		F	W	T	K	G	A	B	C	
24	115	8	¾	20¼	1⅞	1½	5	5¾	7/16	⅞
	110	7 11/16	11/16	20¼	1⅞	1½	5	5 11/16	7/16	⅞
	105	7⅞	⅝	20¼	1⅞	1½	5	5⅝	⅜	⅞
24	100	7¼	¾	20¾	1⅝	27/32	4	5¾	7/16	⅞
	95	7 1/16	11/16	20¾	1⅝	27/32	4	5 11/16	7/16	⅞
	90	7⅛	⅝	20¾	1⅝	27/32	4	5⅝	⅜	⅞
	85	7 1/16	9/16	20¾	1⅝	27/32	4	5 9/16	⅜	⅞
	80	7	½	20¾	1⅝	27/32	4	5½	7/16	⅞
20	100	7 9/32	27/64	16½	1¾	29/32	4	5⅞	½	⅞
	95	7 11/64	11/16	16½	1¾	29/32	4	5 13/16	½	⅞
	90	7¼	27/64	16½	1¾	29/32	4	5¾	7/16	⅞
	85	7 1/16	27/64	16½	1¾	29/32	4	5 11/16	7/16	⅞
	80	7	13/32	16½	1¾	29/32	4	5⅝	⅜	⅞
20	75	6 13/16	21/64	17	1½	25/32	3½	5 11/16	7/16	⅞
	70	6 21/32	11/32	17	1½	25/32	3½	5 9/16	⅜	⅞
	65	6¼	½	17	1½	25/32	3½	5½	7/16	⅞
18	90	7¼	13/32	14½	1¾	29/32	4	5 13/16	½	⅞
	85	7 5/32	13/32	14½	1¾	29/32	4	5¾	7/16	⅞
	80	7 1/64	27/64	14½	1¾	29/32	4	5⅝	⅜	⅞
	75	7	9/16	14½	1¾	29/32	4	5 9/16	⅜	⅞
18	70	6 17/32	23/64	15¼	1⅜	11/16	3¼	5¾	7/16	⅞
	65	6 11/32	11/32	15¼	1⅜	11/16	3¼	5⅝	⅜	⅞
	60	6 3/32	9/16	15¼	1⅜	11/16	3¼	5 9/16	⅜	⅞
	55	6	21/64	15¼	1⅜	11/16	3¼	5½	7/16	⅞
15	100	6 49/64	1 1/16	11	2	1 1/32	3¾	6 9/16	11/16	⅞
	95	6 25/32	1 1/64	11	2	1 1/32	3¾	6 1/16	⅝	⅞
	90	6 27/32	21/32	11	2	1 1/32	3¾	6	⅝	⅞
	85	6 13/16	43/64	11	2	1 1/32	3¾	5 7/8	½	⅞
	80	6 13/32	11/16	11	2	1 1/32	3¾	5 13/16	½	⅞
15	75	6 13/32	7/16	11¾	1⅝	11/16	3¼	5 7/8	½	¾
	70	6 1/16	23/32	11¾	1⅝	11/16	3¼	5¾	7/16	¾
	65	6 3/32	11/16	11¾	1⅝	11/16	3¼	5 11/16	7/16	¾
	60	6	19/32	11¾	1⅝	11/16	3¼	5⅝	⅜	¾
15	55	5¾	21/32	12½	1¼	⅝	3	5⅝	⅜	¾
	50	5 41/64	9/16	12½	1¼	⅝	3	5 9/16	⅜	¾
	45	5 11/16	19/32	12½	1¼	⅝	3	5½	7/16	¾

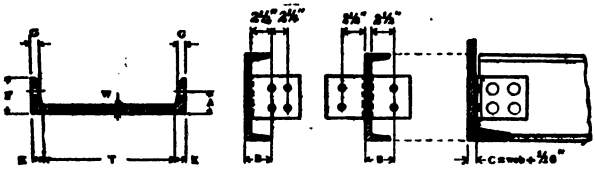
STANDARD STEEL I BEAMS



WEIGHTS AND DIMENSIONS

Depth of Beam, Inches	Weight per Foot, Pounds	Dimensions in Inches F	W	T	K	G	A	B	C	Maximum Rivet or Bolt, Inch
15	42	5½	13/32	12½	1¼	5/8	3	5 7/16	¼	¾
12	55	5 11/32	13/32	9¼	1 3/16	21/32	3	5 13/16	½	¾
	50	5 11/32	7/16	9¼	1 3/8	11/16	3	5 11/16	7/16	¾
	45	5 11/32	11/32	9¼	1 3/8	11/16	3	5 9/16	3/8	¾
	40	5¼	29/64	9¼	1 3/8	11/16	3	5½	5/16	¾
12	35	5 3/32	7/16	9¾	1⅛	17/32	2¾	5 7/16	5/16	¾
	31½	5	11/32	9¾	1⅛	17/32	2¾	5 3/8	¼	¾
10	40	5 3/32	¾	8	1	13/16	2 5/8	5 3/4	7/16	¾
	35	4 31/32	23/64	8	1	13/16	2 5/8	5 5/8	3/8	¾
	30	4 31/32	21/64	8	1	13/16	2 5/8	5½	5/16	¾
	25	4 31/32	9/16	8	1	13/16	2 5/8	5 5/16	¼	¾
9	35	4 15/16	47/64	7	1	7/16	2½	5¾	7/16	¾
	30	4 15/16	9/16	7	1	7/16	2½	5 9/16	3/8	¾
	25	4 15/16	13/32	7	1	7/16	2½	5 7/16	5/16	¾
	21	4 15/16	7/16	7	1	7/16	2½	5 5/16	¼	¾
8	25½	4 17/32	31/64	6¼	7/8	13/32	2¼	5 9/16	3/8	¾
	23	4 31/32	29/64	6¼	7/8	13/32	2¼	5 7/16	5/16	¾
	20½	4 31/32	13/32	6¼	7/8	13/32	2¼	5 3/8	¼	¾
	18	4	17/64	6¼	7/8	13/32	2¼	5 5/16	5/16	¾
7	20	3 7/8	23/64	5¼	7/8	3/8	2¼	5½	5/16	5/8
	17½	3 29/32	11/32	5¼	7/8	3/8	2¼	5 3/8	¼	5/8
	15	3 29/32	¼	5¼	7/8	3/8	2¼	5¼	5/16	5/8
6	17¼	3 31/32	15/32	4½	¾	11/32	2	5½	5/16	5/8
	14¾	3 29/32	23/64	4½	¾	11/32	2	5 3/8	¼	5/8
	12¼	3 31/32	11/64	4½	¾	11/32	2	5¼	5/16	5/8
5	17	3 5/8	3/8	3¼	7/8	11/32	1¾	5 3/8	¼	5/8
	14¾	3 11/32	½	3½	¾	5/16	1¾	5½	5/16	½
	12¼	3 5/32	11/32	3½	¾	5/16	1¾	5 3/8	¼	½
	9¾	3	11/64	3½	¾	5/16	1¾	5¼	5/16	½
4	10½	2 7/8	13/32	2¾	5/8	9/32	1½	5 7/16	5/16	½
	9½	2 13/16	11/32	2¾	5/8	9/32	1½	5 3/8	¼	½
	8½	2 13/16	17/64	2¾	5/8	9/32	1½	5¼	5/16	½
	7½	2 13/16	15/64	2¾	5/8	9/32	1½	5 5/16	5/16	½
3	7½	2 3/8	23/64	1¾	5/8	¼	1 7/8	5 3/8	¼	3/8
	6½	2 5/16	17/64	1¾	5/8	¼	1 7/8	5¼	5/16	3/8
	5½	2 5/16	11/64	1¾	5/8	¼	1 7/8	5 5/16	5/16	3/8

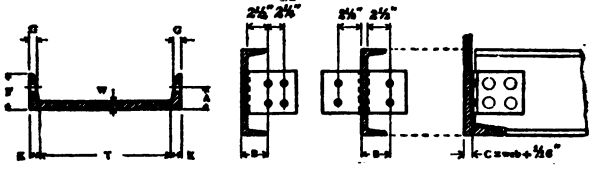
STANDARD STEEL CHANNELS



WEIGHTS AND DIMENSIONS

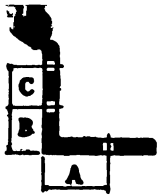
Depth of Beam, Inches	Weight per Foot, Pounds	Dimensions in Inches								Maximum Rivet or Bolt, Inch
		F	W	T	K	G	A	B	C	
15	55	3 13/16	11/16	12 1/4	1 3/8	5/8	2 1/4	3 5/16	7/8	3/4
	50	3 11/16	11/16	12 1/4	1 3/8	5/8	2 1/4	3 1/4	11/16	3/4
	45	3 5/8	5/8	12 1/4	1 3/8	5/8	2 1/4	3 1/8	11/16	3/4
	40	3 7/16	7/16	12 1/4	1 3/8	21/32	1 7/8	3	5/8	3/4
	35	3 3/16	7/16	12 1/4	1 3/8	21/32	1 7/8	2 15/16	1/2	3/4
	33	3 1/16	11/32	12 1/4	1 3/8	21/32	1 7/8	2 7/8	1/2	3/4
13	50	4 7/16	11/16	10 1/2	1 1/4	1/2	2 3/4	3 5/16	7/8	3/4
	45	4 5/16	11/16	10 1/2	1 1/4	1/2	2 3/4	3 3/16	3/4	3/4
	40	4 3/16	9/16	10 1/2	1 1/4	1/2	2 3/4	3 1/8	5/8	3/4
	37	4 1/8	1/2	10 1/2	1 1/4	17/32	2 1/2	3	9/16	3/4
	35	4 1/16	11/16	10 1/2	1 1/4	17/32	2 1/2	2 15/16	1/2	3/4
	32	4	5/8	10 1/2	1 1/4	17/32	2 1/2	2 7/8	7/16	3/4
12	40	3 27/32	11/16	10	1	15/32	2	3 1/4	11/16	3/4
	35	3 13/16	11/16	10	1	15/32	2	3 1/8	11/16	3/4
	30	3 11/16	11/16	10	1	15/32	2	3	9/16	3/4
	25	3 1/2	7/16	10	1	15/32	1 3/4	2 7/8	7/16	3/4
	20 1/2	2 15/16	9/32	10	1	15/32	1 3/4	2 11/16	3/8	3/4
10	35	3 3/16	11/16	8 1/4	7/8	3/8	2	3 5/16	7/8	3/4
	30	3 1/16	11/16	8 1/4	7/8	3/8	2	3 3/16	3/4	3/4
	25	2 27/32	7/16	8 1/4	7/8	3/8	2	3	5/8	3/4
	20	2 11/16	5/16	8 1/4	7/8	7/16	1 1/2	2 7/8	7/16	3/4
	15	2 1/2	11/32	8 1/4	7/8	7/16	1 1/2	2 3/4	7/16	3/4
9	25	2 13/16	11/16	7 1/4	7/8	3/8	1 3/4	3 1/8	11/16	3/4
	20	2 11/16	11/16	7 1/4	7/8	3/8	1 3/4	3	1/2	3/4
	15	2 1/2	7/16	7 1/4	7/8	11/32	1 3/8	2 13/16	3/8	3/4
	13 1/4	2 7/16	11/32	7 1/4	7/8	11/32	1 3/8	2 3/4	7/16	3/4

STANDARD STEEL CHANNELS



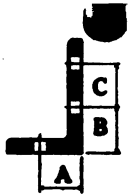
WEIGHTS AND DIMENSIONS

Depth of Beam, Inches	Weight per Foot, Pounds	Dimensions in Inches								Maximum Rivet or Bolt, Inch
		F	W	T	K	G	A	B	C	
8	21¼	2 5/8	17/64	6¼	7/8	3/8	1½	3 1/16	5/8	3/4
	18¾	2 17/32	31/64	6¼	7/8	3/8	1½	3	9/16	3/4
	16¼	2 7/16	1/2	6¼	7/8	3/8	1½	2 7/8	1/2	3/4
	13¾	2 11/32	5/16	6¼	7/8	3/8	1¼	2 13/16	7/16	3/4
	11¼	2 7/64	7/32	6¼	7/8	3/8	1¼	2¾	5/16	3/4
7	19¾	2 23/64	41/64	5½	3/4	3/8	1½	3 1/8	11/16	5/8
	17¼	2 13/32	17/32	5½	3/4	3/8	1½	3	9/16	5/8
	14¾	2 15/64	37/64	5½	3/4	11/32	1¼	2 15/16	1/2	5/8
	12¼	2 13/64	9/16	5½	3/4	11/32	1¼	2 13/16	3/8	5/8
	9¾	2 3/32	13/64	5½	3/4	11/32	1¼	2 11/16	1/4	5/8
6	15½	2 9/32	9/16	4½	3/4	11/32	1 3/8	3 1/16	5/8	5/8
	13	2 5/32	1/2	4½	3/4	11/32	1 3/8	2 15/16	1/2	5/8
	10½	2 1/32	7/16	4½	3/4	11/32	1 1/8	2 13/16	3/8	5/8
	8	1 59/64	11/32	4½	3/4	11/32	1 1/8	2 11/16	1/4	5/8
5	11½	2 1/32	31/64	3¾	5/8	5/16	1¼	3	9/16	1/2
	9	1 47/64	29/64	3¾	5/8	5/16	1¼	2 13/16	3/8	1/2
	6½	1 3/4	3/16	3¾	5/8	5/16	1	2 11/16	1/4	1/2
4	7¼	1 23/32	21/64	2¾	5/8	9/32	1	2 13/16	3/8	1/2
	6¼	1 11/16	1/4	2¾	5/8	9/32	1	2¾	5/16	1/2
	5¼	1 37/64	9/32	2¾	5/8	9/32	1	2 11/16	1/4	1/2
3	6	1 39/64	23/64	1¾	5/8	1/4	11/16	2 7/8	7/16	3/8
	5	1 1/2	7/16	1¾	5/8	1/4	11/16	2¾	5/16	3/8
	4	1 13/32	11/64	1¾	5/8	1/4	11/16	2 11/16	1/4	3/8



STANDARD STEEL ANGLES

WEIGHT PER FOOT AND DIMENSIONS

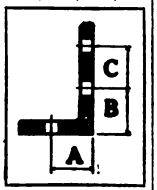


Size of Angle	Thickness in Inches																		Gauge			Maximum Rivet or Bolt
	1½	1 1/16	1	15/16	⅞	13/16	¾	11/16	⅝	9/16	½	7/16	3/8	5/16	¼	3/16	1/8	1/16	A	B	C	
EQUAL LEG ANGLES—STRUCTURAL SIZES																						
8 ×8	56.9	54.0	51.0	48.1	45.0	42.0	38.9	35.8	32.7	29.6	26.4	....	....	....	....	....	....	....	5	3	3½	1
6 ×6	....	....	37.4	35.3	33.1	31.0	28.7	26.5	24.2	21.9	19.6	17.2	14.9	....	....	....	....	....	3½	2½	2¼	⅞
5 ×5	....	....	30.6	28.9	27.2	25.4	23.6	21.8	20.0	18.1	16.2	14.3	12.3	....	....	....	....	....	3	1¾	2	⅞
4 ×4	....	....	....	....	....	19.9	18.5	17.1	15.7	14.3	12.8	11.3	9.8	8.2	6.6	....	....	....	2½	....	....	⅞
3½×3½	....	....	....	....	....	17.1	16.0	14.8	13.6	12.4	11.1	9.8	8.5	7.2	5.8	*4.4	*3.64	....	2	....	....	⅞
3 ×3	....	....	....	....	....	....	....	....	11.5	10.4	9.4	8.3	7.2	6.1	4.9	*3.71	*2.5	....	1¾	....	....	¾
BAR MILL SIZES																						
2½×2½	....	....	....	....	....	....	....	....	....	....	8.5	7.6	6.6	5.6	4.5	3.39	2.29	.....	1½	....	....	¾
2½×2½	....	....	....	....	....	....	....	....	....	....	7.7	6.8	5.9	5.0	4.1	3.07	2.08	.....	1½	....	....	¾
2¼×2¼	....	....	....	....	....	....	....	....	....	....	6.8	6.1	5.2	4.5	3.62	2.75	1.86	.....	1¼	....	....	⅝
2 ×2	....	....	....	....	....	....	....	....	....	....	....	5.3	4.7	3.92	3.19	2.44	1.65	.....	1½	....	....	⅝
1¾×1¾	....	....	....	....	....	....	....	....	....	....	....	4.6	3.99	3.39	2.77	2.12	1.44	.....	1	....	....	½
1½×1½	....	....	....	....	....	....	....	....	....	....	....	....	3.35	2.86	2.34	1.80	1.23	0.93	⅞	....	....	½
1¼×1¼	....	....	....	....	....	....	....	....	....	....	....	....	....	2.33	1.92	1.48	1.01	.....	¾	....	....	½
1⅛×1⅛	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.32	0.91	.....	⅝	....	....	½
1 ×1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.49	1.16	0.80	.....	½	....	....	½
⅞× ⅞	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.00	0.70	0.53	½	....	....	½
¾× ¾	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0.84	0.59	0.45	½	....	....	½
⅝× ⅝	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	0.48	0.37	⅜	....	....	½
½× ½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	0.38	0.29	½	....	....	½

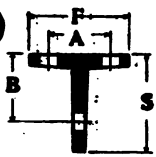
*Bar Mill Sizes.

STANDARD STEEL ANGLES — CONTINUED

Size of Angle	Thickness in Inches																			Gauge			Maximum Rivet or Bolt
	1⅛	1/16	1	11/16	⅞	13/16	¾	11/16	⅝	9/16	½	7/16	⅜	5/16	¼	3/16	⅛	1/16		A	B	C	
UNEQUAL LEG ANGLES — STRUCTURAL SIZES																							
8 ×6	....	....	44.2	41.7	39.1	36.5	33.8	31.2	28.5	25.7	23.0	20.2	....	....	....	....	....	....	....	3½	3	3½	7/8
7 ×3½	....	....	32.3	30.5	28.7	26.8	24.9	23.0	21.0	19.1	17.0	15.0	13.0	....	....	....	....	....	....	2	2½	3	7/8
6 ×4	....	....	30.6	28.9	27.2	25.4	23.6	21.8	20.0	18.1	16.2	14.3	12.3	....	....	....	....	....	....	2½	2½	2½	7/8
6 ×3½	....	....	28.9	27.3	25.7	24.0	22.4	20.6	18.9	17.1	15.3	13.5	11.7	9.8	....	....	....	....	....	2	2½	2¼	7/8
5 ×4	....	....	....	....	24.2	22.7	21.1	19.5	17.8	16.2	14.5	12.8	11.0	....	....	....	....	....	....	2½	1¾	2	7/8
5 ×3½	....	....	....	....	22.7	21.3	19.8	18.3	16.8	15.2	13.6	12.0	10.4	8.7	....	....	....	....	....	2	1¾	2	7/8
5 ×3	....	....	....	....	....	19.9	18.5	17.1	15.7	14.3	12.8	11.3	9.8	8.2	....	....	....	....	....	1¾	1¾	2	¾
4½×3	....	....	....	....	....	18.5	17.3	16.0	14.7	13.3	11.9	10.6	9.1	7.7	....	....	....	....	....	1¾	2¾	....	¾
4 ×3½	....	....	....	....	....	18.5	17.3	16.0	14.7	13.3	11.9	10.6	9.1	7.7	....	....	....	....	....	2	2½	....	7/8
4 ×3	....	....	....	....	....	17.1	16.0	14.8	13.6	12.4	11.1	9.8	8.5	7.2	5.8	....	....	....	....	1¾	2½	....	¾
3½×3	....	....	....	....	....	15.8	14.7	13.6	12.5	11.4	10.2	9.1	7.9	6.6	5.4	....	....	....	....	1¾	2	....	¾
3½×2½	....	....	....	....	....	....	....	12.5	11.5	10.4	9.4	8.3	7.2	6.1	4.9	....	....	....	....	1½	2	....	¾
3 ×2½	....	....	....	....	....	....	....	....	....	9.5	8.5	7.6	6.6	5.6	4.5	*3.39	....	....	....	1⅛	1¾	....	¾
3 ×2	....	....	....	....	....	....	....	....	....	....	7.7	6.8	5.9	5.0	4.1	*3.07	....	....	....	1⅛	1¾	....	⅝
BAR MILL SIZES																							
2½×2	....	....	....	....	....	....	....	....	....	....	6.8	6.1	5.3	4.5	3.62	2.75	1.86	....	....	1⅛	1⅝	....	⅝
2½×1¾	....	....	....	....	....	....	....	....	....	....	....	....	....	4.2	3.40	2.59	....	....	....	1	1⅝	....	½
2½×1½	....	....	....	....	....	....	....	....	....	....	....	....	....	3.92	3.19	2.44	....	....	....	⅞	1⅝	....	½
2¼×1½	....	....	....	....	....	....	....	....	....	....	5.6	5.0	4.4	3.66	2.98	2.28	....	....	....	⅞	1¼	....	½
2 ×1½	....	....	....	....	....	....	....	....	....	....	....	....	3.99	3.39	2.77	2.12	1.44	....	....	⅞	1½	....	½
2 ×1¼	....	....	....	....	....	....	....	....	....	....	....	....	3.83	3.26	2.66	2.04	....	....	....	⅞	1⅛	....	½
2 ×1⅛	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2.55	1.96	....	....	....	¾	1⅛	....	½
1¾×1¼	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2.34	1.80	1.23	....	....	¾	1	....	½
1¾×1⅛	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2.24	1.72	1.17	....	....	⅝	1	....	½
1½×1¼	....	....	....	....	....	....	....	....	....	....	....	....	....	2.59	2.13	1.64	....	....	....	¾	⅞	....	½
1¼×1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.81	1.40	0.96	....	....	11/16	¾	....	¼
1¼× ⅞	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.32	0.91	....	....	11/16	11/16	....	¼
1¼× ¾	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0.85	....	....	11/16	¾	....	¼
1 × ¾	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.00	0.70	....	....	5/8	11/16	....	⅛
1 × ⅝	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0.92	0.64	....	....	⅝	5/8	....	⅛
⅞× ½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7/16	0.42	....	1/2	1/2	....	1/2
11/16× ½	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0.62	....	....	1/2	1/2	....	1/2

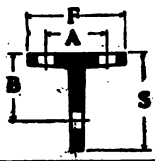


*Bar Mill Sizes



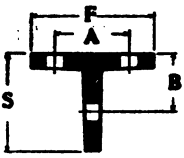
TEES

EQUAL LEGS



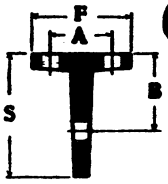
Size of Tee	Thickness in Inches		Weight per Foot	Gauge of Holes		Maximum Rivet or Bolt	
F×S	Flange	Stem		A	B	F	S
4 ×4	¼ to ⅜	¾ to ⅞	16.9	2¼	2½	⅝	⅞
	½ to ⅝	½ to ⅝	13.5	2¼	2½	⅝	⅞
	⅝ to ½	⅜ to ½	12.4	2¼	2½	⅝	⅞
	⅝ to ⅝	⅝ to ⅝	10.5	2¼	2½	⅝	⅞
3½×3½	¼ to ⅜	½ to ⅝	11.7	2	2½	½	⅞
	⅜ to ½	⅜ to ½	10.6	2	2½	½	⅞
	⅝ to ⅝	⅝ to ⅝	9.2	2	2½	½	⅞
3 ×3	¼ to ⅜	½ to ⅝	9.9	1¾	1⅞	½	⅞
	⅜ to ½	⅜ to ½	8.9	1¾	1⅞	½	⅞
	⅝ to ⅝	⅝ to ⅝	7.8	1¾	1⅞	½	⅞
	⅜ to ⅝	⅜ to ⅝	6.7	1¾	1⅞	½	⅞
	¼ to ⅜	¼ to ⅜	5.7	1¾	1⅞	½	⅞
2½×2½	⅜ to ⅜	⅜ to ⅜	6.4	1⅝	1¾	⅜	⅝
	⅜ to ⅝	⅜ to ⅝	5.5	1⅝	1¾	⅜	⅝
2¼×2¼	⅜ to ⅝	⅜ to ⅝	4.9	1⅜	1½	⅜	½
	¼ to ⅜	¼ to ⅜	4.1	1⅜	1½	⅜	½
	¼ to ¼	¼ to ¼	3.95	1⅜	1½	⅜	½
2 ×2	⅜ to ⅝	⅜ to ⅝	4.3	1¼	1⅜	⅜	½
	¼ to ⅜	¼ to ⅜	3.56	1¼	1⅜	⅜	½
	¼ to ¼	¼ to ¼	3.5	1¼	1⅜	⅜	½
1¾×1¾	¼ to ⅜	¼ to ⅜	3.09	1⅛	1¼	⅜	½
	¼ to ¼	¼ to ¼	3.00	1⅛	1¼	⅜	½
	¼ to ¼	¼ to *	2.9	1⅛	1¼	⅜	½
	⅜ to ¼	⅜ to ¼	2.33	1⅛	1¼	⅜	½
	⅜ to ⅜	⅜ to *	2.26	1⅛	1¼	⅜	½
1½×1½	¼ to ⅜	¼ to ⅜	2.47	1	1⅛	¼	⅜
	¼ to ¼	¼ to *	2.43	1	1⅛	¼	⅜
	⅜ to ⅜	⅜ to ⅜	1.94	1	1⅛	¼	⅜
	⅜ to ⅜	⅜ to *	1.90	1	1⅛	¼	⅜
1¼×1¼	¼ to ⅜	¼ to ⅜	2.02	‖	⅞	¼	¼
	¼ to ¼	¼ to *	1.98	‖	⅞	¼	¼
	⅜ to ⅜	⅜ to ⅜	1.59	‖	⅞	¼	¼
	⅜ to ⅜	⅜ to *	1.55	‖	⅞	¼	¼
	⅛ to ⅛	⅛ to *	1.09	‖	⅞	¼	¼
1⅛×1⅛	⅜ to ⅜	⅜ to *	1.37	¾	‖	¼	¼
	⅛ to ⅛	⅛ to *	0.97	¾	‖	¼	¼
1 ×1	¼ to ¼	¼ to *	1.53	⅝	⅞	¼	¼
	⅜ to ⅜	⅜ to ⅜	1.25	⅝	⅞	¼	¼
	⅜ to ⅜	⅜ to *	1.20	⅝	⅞	¼	¼
	⅛ to ⅛	⅛ to ⅜	0.89	⅝	⅞	¼	¼
	⅛ to ⅛	⅛ to *	0.85	⅝	⅞	¼	¼
⅞× ⅞	⅛ to ⅛	⅛ to *	.73	½	⅞	¼	¼
¾× ¾	⅛ to ⅛	⅛ to *	.61	½	⅞	¼	¼
⅝× ⅝	⅛ to ⅛	⅛ to *	.50	½	⅞	¼	¼
½× ½	⅛ to ⅛	⅛ to ⅜	.34	½	⅞	¼	¼

*Rolled approximately to one degree taper each side of stem.



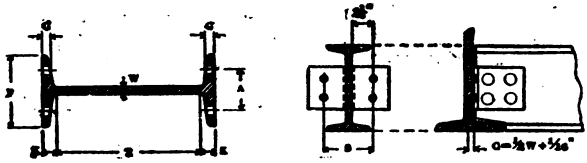
TEES

UNEQUAL LEGS



Size of Tee	Thickness in Inches		Weight per Foot	Gauge of Holes		Maximum Rivet or Bolt	
F×S	Flange	Stem		A	B	F	S
5 ×3	½ to ⅞	⅜ to ⅝	13.4	2¾	1⅞	¾	¾
5 ×2½	⅜ to ½	⅜ to ⅜	10.9	2¾	1¾	¾	⅝
4½×3½	½ to ⅞	⅜ to ⅝	15.7	2½	2¼	¾	⅞
4½×3	⅜ to ½	⅜ to ½	9.8	2½	1⅞	¾	⅞
	½ to ⅝	½ to ⅝	8.4	2½	1⅞	¾	⅞
4½×2½	⅜ to ½	⅜ to ½	9.2	2½	1¾	¾	⅝
	½ to ⅝	½ to ⅝	7.8	2½	1¾	¾	⅝
4 ×5	½ to ⅝	½ to ⅝	15.3	2¼	3	⅝	⅞
	⅝ to ⅞	⅝ to ⅞	11.9	2¼	3	⅝	⅞
4 ×4½	½ to ⅝	½ to ⅝	14.4	2¼	2¾	⅝	⅞
	⅝ to ⅞	⅝ to ⅞	11.2	2¼	2¾	⅝	⅞
4 ×3	⅜ to ½	⅜ to ½	9.2	2¼	1⅞	⅝	⅞
	½ to ⅝	½ to ⅝	7.8	2¼	1⅞	⅝	⅞
4 ×2½	⅜ to ½	⅜ to ½	8.5	2¼	1¾	⅝	⅝
	½ to ⅝	½ to ⅝	7.2	2¼	1¾	⅝	⅝
4 ×2	⅜ to ½	⅜ to ½	7.8	2¼	1⅜	⅝	½
	½ to ⅝	½ to ⅝	6.7	2¼	1⅜	⅝	½
3½×4	½ to ⅝	½ to ⅝	12.6	2	2½	½	⅞
	⅝ to ⅞	⅝ to ⅞	9.8	2	2½	½	⅞
3½×3	½ to ⅝	½ to ⅝	10.8	2	1⅞	½	⅞
	⅝ to ½	½ to ½	9.8	2	1⅞	½	⅞
	⅝ to ½	½ to ½	8.5	2	1⅞	½	⅞
	½ to ⅝	½ to ⅝	7.5	2	1⅞	½	⅝
3 ×4	½ to ⅝	½ to ⅝	11.7	1¾	2½	½	⅞
	⅝ to ½	½ to ½	10.5	1¾	2½	½	⅞
	⅝ to ⅞	⅝ to ⅞	9.2	1¾	2½	½	⅝
3 ×3½	½ to ⅝	½ to ⅝	10.8	1¾	2¼	½	⅞
	⅝ to ½	½ to ½	9.7	1¾	2¼	½	⅞
	⅝ to ⅞	⅝ to ⅞	8.5	1¾	2¼	½	⅞
3 ×2½	⅜ to ½	⅜ to ½	7.1	1¾	1¾	½	⅝
	½ to ⅝	½ to ⅝	6.1	1¾	1¾	½	⅝
	¼ to ½	¼ to ½	5.0	1¾	1¾	½	⅝
2½×3	⅜ to ½	⅜ to ½	7.1	1⅝	1⅞	⅜	⅞
	½ to ⅝	½ to ⅝	6.1	1⅝	1⅞	⅜	⅞
2½×2	¼ to 11/32	¼ to 11/32	4.8	1⅝	1⅝	⅜	½
2½×1¾	¼ to 11/32	¼ to 11/32	3.9	1⅝	1¼	⅜	½
2½×1¼	¼ to 11/32	¼ to 11/32	2.87	1⅝	⅞	⅜	¼
2 ×1½	¼ to ⅜	¼ to ⅜	3.09	1¼	1½	⅜	⅜
1½×2	¼ to ⅜	¼ to ⅜	2.45	1	1¾	¼	½
1½×1¼	⅛ to 11/32	⅛ to 11/32	1.25	1	⅞	¼	¼

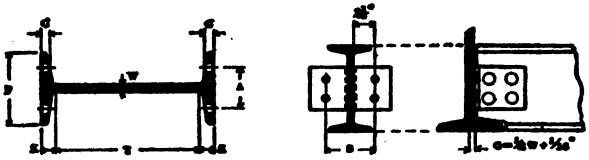
BETHLEHEM GIRDER BEAMS



WEIGHTS AND DIMENSIONS

Depth of Beam, Inches	Weight per Foot, Pounds	Dimensions in Inches								Maximum Rivet or Bolt, Inch
		F	W	T	K	G	A	B	C	
30	200	15	3/4	25 3/16	2 13/32	1 1/8	11	5 3/4	7/16	1
	180	13	11/16	25 3/16	2 13/32	1 7/32	9	5 11/16	7/16	1
28	180	14 11/32	11/16	23 3/8	2 5/16	1 3/32	10 1/4	5 11/16	7/16	1
	165	12 1/2	21/32	23 3/8	2 5/16	1 3/16	8 1/2	5 11/16	5/8	1
26	160	13 19/32	5/8	21 5/8	2 3/16	1 1/16	9 1/2	5 5/8	3/8	1
	150	12	5/8	21 5/8	2 3/16	1 1/8	8	5 5/8	3/8	1
24	140	13	19/32	20	2	31/32	9	5 5/8	3/8	1
	120	12	17/32	20 1/4	1 7/8	29/32	8	5 1/2	5/16	1
20	140	12 1/2	41/64	15 11/16	2 5/32	1 1/8	8 1/2	5 5/8	3/8	1
	112	12	33/64	16 3/8	1 13/16	7/8	8	5 9/16	5/16	1
18	92	11 1/2	31/64	14 3/4	1 5/8	25/32	7 1/2	5 1/2	5/16	1
15	140	11 3/4	51/64	10 1/8	2 7/16	1 9/32	7 3/4	5 13/16	7/16	1
	104	11 1/4	47/64	11 1/8	1 15/16	1 1/16	7 1/4	5 5/8	3/8	1
	73	10 1/2	7/16	12 1/16	1 15/32	11/16	6 1/2	5 7/16	1/4	1
12	70	10	15/32	9	1 1/2	3/4	6	5 7/16	5/16	1
	55	9 3/4	3/8	9 1/2	1 1/4	13/32	6	5 3/8	1/4	1
10	44	9	5/16	7 3/4	1 1/8	17/32	5 1/2	5 5/16	3/16	7/8
9	38	8 1/2	19/64	6 7/8	1 1/16	15/32	5 1/4	5 5/16	3/16	7/8
8	32 1/2	8	19/64	6	1	7/16	5	5 5/16	3/16	7/8

BETHLEHEM I BEAMS



WEIGHTS AND DIMENSIONS

Depth of Beam, Inches	Weight per Foot, Pounds	Dimensions in Inches								Maximum Rivet or Bolt, Inch
		F	W	T	K	G	A	B	C	
30	120	10½	11/64	26 7/16	1 25/32	21/32	6½	5 9/16	5/16	1
28	105	10	½	24 11/16	1 23/32	27/32	6	5½	5/16	1
26	90	9½	15/32	23	1½	25/32	5½	5 7/16	5/16	1
24	84	9¼	15/32	21	1½	¾	5¼	5 7/16	5/16	⅞
	83	9⅛	29/64	21 5/16	1 11/32	11/16	5¼	5½	5/16	⅞
	73	9	25/64	21 5/16	1 11/32	11/16	5¼	5⅜	¼	⅞
20	82	8 17/64	17/64	17⅛	1 7/16	¾	5	5 9/16	5/16	⅞
	72	8¾	7/16	17⅛	1 7/16	¾	5	5 7/16	¼	⅞
	69	8 9/64	13/64	17½	1¼	⅝	4½	5½	5/16	⅞
	64	8 1/64	23/64	17½	1¼	⅝	4½	5 7/16	5/16	⅞
	59	8	⅜	17½	1¼	⅝	4½	5⅜	¼	⅞
18	59	7 43/64	½	15¾	1⅛	9/16	4¼	5½	5/16	⅞
	54	7 19/32	29/64	15¾	1⅛	9/16	4¼	5 7/16	¼	⅞
	52	7 9/16	⅜	15¾	1⅛	9/16	4¼	5⅜	¼	⅞
	48½	7½	21/64	15¾	1⅛	9/16	4¼	5 5/16	¼	⅞
15	71	7½	33/64	11¾	1⅝	11/16	4¼	5½	5/16	⅞
	64	7 5/16	13/32	12 5/16	1 11/32	¾	4	5⅜	⅜	⅞
	54	7	13/32	12 5/16	1 11/32	23/32	4	5 7/16	¼	⅞
	46	6 23/32	7/16	12⅜	1⅜	11/32	3¾	5 7/16	5/16	⅞
	41	6 11/16	11/32	12⅜	1⅜	11/32	3¾	5 5/16	¼	⅞
	38	6 21/32	11/64	12⅜	1⅜	11/32	3¾	5⅜	5/16	⅞
12	36	6 13/64	5/16	9⅞	1 1/16	9/16	3½	5 5/16	5/16	¾
	32	6⅜	21/64	10 5/16	1 1/16	9/16	3½	5⅜	¼	¾
	28½	6⅛	¼	10 5/16	1 1/16	7/16	3½	5¼	5/16	¾
10	28½	5 53/64	21/64	8⅜	1⅛	⅝	3¼	5⅜	¼	¾
	23½	5 27/32	¼	8⅜	1⅛	⅝	3¼	5¼	5/16	¾

EXPLANATION OF TABLES OF SAFE LOADS

The following tables give the greatest safe load (evenly distributed over the entire length) which the steel shapes used as beams will carry.

These loads include the weight of the beam, which must be deducted to obtain the net load.

The loads given are based on a fiber stress of 16,000 pounds per square inch, and are entirely reliable for ordinary conditions where loads are quiescent, as in buildings.

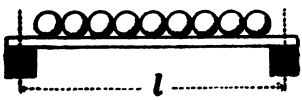
For fluctuating loads causing vibration, especially if the beams are long as compared to their depth, the tabular loads should be reduced one-fifth; for rapidly moving loads, or where loads are suddenly applied with slight impact, the tabular loads should be reduced one-third.

It is assumed that the beams are stiffened sideways to prevent buckling in the compression flange, otherwise tabular load must be reduced as follows:

Length of Beam	Proportion to be used	Length of Beam	Proportion to be used
20×flange width	Whole tab. load	50×flange width	$\frac{7}{10}$ tabular load
30×flange width	$\frac{9}{10}$ tabular load	60×flange width	$\frac{6}{10}$ tabular load
40×flange width	$\frac{8}{10}$ tabular load	70×flange width	$\frac{1}{2}$ tabular load

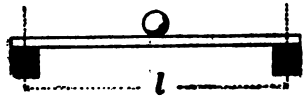
In many cases deflection will govern. The allowable deflection for plastered ceilings is 1-360 of the span. The deflection will be reduced in the same ratio as the load on the beam.

The bending moments and deflections of beams under various systems of loading are given below: W=Total load. l=Length of beam. M=Maximum bending moment.



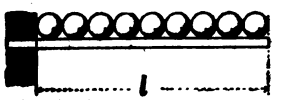
Safe load=that given in tables. Max. bending moment at centre=$\frac{Wl}{8}$.

Deflection as in tables.



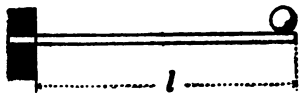
Safe load=½ that given in tables $M=\frac{Wl}{4}$.

Deflection=$\frac{5}{8}$ that given in tables.

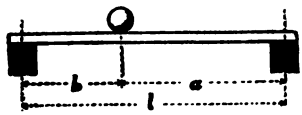


Safe load=¼ that given in tables. $M=\frac{Wl}{2}$.

Deflection=2.4 that given in tables.

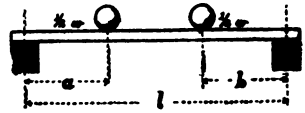


Safe load=½ that given in tables. M at point of support=Wl. Deflections=3.2 that given in tables.



Safe load=that given in tables $\times\frac{l^2}{8ab}$.

Max. bending moment, $M=\frac{Wab}{l}$.



Safe load=that given table $\times\frac{l}{4a}$.

Max. bending moment between loads=½ Wa.

STANDARD STEEL I BEAMS

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

Safe loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of beam.

D=the deflection in inches under the safe load.

For safe loads and deflections under various systems of loading, see explanation.

Distance Between Supports in Feet	24" I					
	115 Pounds	105 Pounds	100 Pounds	90 Pounds	80 Pounds	D
10	262820	249910	211520	198970	185530	.07
11	238930	227190	192290	180880	168660	.08
12	219020	208260	176270	165810	154610	.10
13	202170	192240	162710	153050	142720	.12
14	187730	178510	151080	142120	132520	.14
15	175210	166610	141010	132650	123690	.16
16	164260	156190	132200	124360	115990	.18
17	154600	147010	124420	117040	109140	.20
18	146010	138840	117510	110540	103070	.22
19	138320	131530	111330	104720	97650	.25
20	131410	124950	105760	99480	92770	.28
21	125150	119000	100720	94750	88350	.30
22	119460	113590	96140	90440	84330	.33
23	114270	108660	91960	86510	80670	.36
24	109510	104130	88130	82900	77300	.40
25	105130	99960	84610	79590	74210	.43
26	101080	96120	81350	76530	71360	.47
27	97340	92560	78340	73690	68720	.50
28	93860	89250	75540	71060	66260	.54
29	90620	86170	72940	68610	63980	.58
30	87600	83300	70510	66320	61840	.62
31	84780	80610	68230	64180	59850	.66
32	82130	78090	66100	62180	57980	.70
33	79640	75730	64100	60290	56220	.75
34	77300	73500	62210	58520	54570	.80
35	75090	71400	60430	56850	53010	.85
36	73000	69420	58760	55270	51540	.90
37	71030	67540	57160	53770	50140	.94
38	69160	65760	55660	52370	48850	1.00
39	67390	64080	54230	51010	47570	1.04
40	65700	62470	52880	49710	46400	1 11

Safe loads above light lines are greater than safe loads for web crippling.

For safe loads above dotted lines standard connections will not be of sufficient strength.

STANDARD STEEL I BEAMS

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

Safe loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of beam.

D=the deflection in inches under the safe load.

For safe loads and deflections under various systems of loading, see explanation.

Distance Between Supports in Feet	20" I						18" I				
	100 Pounds	90 Pounds	80 Pounds	70 Lbs.	65 Lbs.	D	90 Lbs.	75 Lbs.	65 Lbs.	55 Lbs.	D
10	176600	166140	156410	130110	124750	.08	149540	135460	104470	94290	.09
11	160540	151040	142190	118280	113410	.10	135950	123150	94980	85720	.11
12	147160	138450	130340	108430	103980	.12	124620	112890	87060	78570	.13
13	135840	127800	120310	100090	95960	.14	115030	104200	80360	72530	.16
14	126140	118670	111720	92940	89110	.16	106810	96760	74620	67350	.18
15	117730	110760	104270	86740	83170	.19	99690	90310	69650	62860	.20
16	110370	103840	97750	81320	77970	.21	93460	84660	65300	58930	.23
17	103880	97730	92000	76540	73380	.24	87960	79680	61460	55460	.27
18	98110	92300	86890	72280	69310	.27	83080	75260	58040	52380	.30
19	92950	87440	82320	68480	65660	.30	78700	71300	54990	49630	.33
20	88300	83070	78200	65060	62370	.33	74770	67730	52240	47140	.37
21	84090	79110	74480	61960	59400	.36	71210	64510	49750	44900	.40
22	80270	75520	71090	59140	56700	.40	67970	61570	47490	42860	.45
23	76780	72230	68000	56570	54240	.44	65020	58900	45420	40990	.49
24	73580	69220	65170	54210	51980	.48	62310	56440	43530	39290	.53
25	70640	66460	62560	52040	49900	.52	59810	54180	41790	37730	.57
26	67920	63900	60160	50040	47980	.56	57510	52100	40180	36260	.62
27	65410	61530	57930	48190	46200	.60	55380	50170	38690	34920	.67
28	63070	59340	55860	46470	44550	.65	53400	48380	37310	33670	.72
29	60900	57290	53930	44870	43020	.70	51560	46710	36030	32510	.77
30	58870	55380	52140	43370	41580	.74	49840	45150	34820	31430	.83
31	56970	53590	50450	41970	40240	.80	48420	43700	33700	30420	.89
32	55190	51920	48880	40660	38980	.85	46730	42330	32650	29460	.94
33	53510	50350	47400	39430	37800	.90	45310	41050	31660	28570	1.00
34	51940	48860	46000	38270	36690	.96	43980	39840	30730	27730	1.06
35	50460	47470	44690	37170	35640	1.01	42720	38700	29850	26940	1.12
36	49060	46150	43450	36140	34650	1.07	41540	37630	29020	26190	1.19
37	47720	44900	42270	35160	33710	1.13	40410	36610	28230	25480	1.25
38	46470	43720	41170	34240	32750	1.20	39350	35650	27490	24750	1.34
39	45280	42600	40100	33360	31980	1.25	38340	34730	26750	24170	1.39
40	44150	41540	39140	32520	31150	1.32	37380	33860	26120	23580	1.47

For safe loads below heavy lines the deflection will be greater than the allowable limit for plaster ceiling.

For safe loads above dotted lines standard connections will not be of sufficient strength.

STANDARD STEEL I BEAMS

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

Safe loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of beam.

D=the deflection in inches under the safe load.

For safe loads and deflections under various systems of loading, see explanation.

Distance Between Supports in Feet	15" I							
	100 Pounds	90 Pounds	80 Pounds	70 Pounds	60 Pounds	50 Pounds	42 Pounds	D
10	127800	119960	112230	94390	86610	68750	62830	.11
11	116180	109050	102030	85810	78740	62500	57120	.13
12	106500	99960	93520	78660	72180	57290	52360	.16
13	98310	92270	86330	72610	66630	52890	48330	.19
14	91280	85680	80160	67420	61870	49110	44890	.22
15	85200	79970	74820	62920	57740	45840	41880	.25
16	79870	74970	70140	58990	54130	42970	39270	.28
17	75180	70560	66020	55520	50950	40440	36960	.32
18	71000	66640	62350	52440	48120	38200	34900	.36
19	67260	63130	59070	49680	45590	36190	33070	.40
20	63900	59960	56110	47190	43310	34380	31410	.44
21	60860	57120	53440	44950	41240	32740	29920	.49
22	58090	54530	51010	42900	39370	31250	28560	.53
23	55560	52150	48800	41040	37660	29890	27320	.58
24	53250	49980	46760	39330	36090	28650	26180	.63
25	51120	47980	44890	37750	34650	27500	25130	.69
26	49150	46140	43170	36300	33310	26440	24160	.75
27	47330	44430	41570	34960	32080	25460	23270	.80
28	45640	42840	40080	33710	30930	24550	22440	.86
29	44070	41360	38700	32550	29870	23710	21680	.93
30	42600	39990	37410	31460	28870	22920	20940	.99
31	41230	38700	36200	30450	27940	22180	20270	1.06
32	39940	37490	35070	29500	27070	21490	19630	1.13
33	38730	36350	34010	28600	26250	20830	19040	1.20
34	37590	35280	33010	27760	25470	20220	18480	1.28
35	36510	34270	32070	26970	24750	19640	17950	1.38
36	35500	33320	31170	26220	24060	19100	17450	1.43

For safe loads below heavy lines the deflection will be greater than the allowable limit for plaster ceiling.

For safe loads above dotted lines standard connections will not be of sufficient strength.

STANDARD STEEL I BEAMS

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

Safe loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of beam.

D=the deflection in inches under the safe load.

For safe loads and deflections under various systems of loading, see explanation.

Distance Between Supports in Feet	12" I						10" I		
	55 Pounds	50 Pounds	40 Pounds	35 Pounds	31½ Pounds	D	35 Pounds	25 Pounds	D
10	57070	53930	47810	40580	38370	.14	31240	26050	.16
11	51880	49030	43470	36890	34880	.17	28400	23680	.20
12	47560	44940	39840	33820	31970	.20	26030	21710	.24
13	43900	41480	36780	31220	29510	.23	24030	20040	.28
14	40760	38520	34150	28990	27400	.27	22310	18610	.32
15	38040	35950	31880	27050	25580	.31	20830	17360	.37
16	35670	33710	29880	25360	23980	.35	19520	16280	.42
17	33570	31720	28130	23870	22570	.40	18380	15320	.48
18	31700	29960	26560	22540	21310	.45	17350	14470	.54
19	30040	28380	25160	21360	20190	.50	16440	13710	.60
20	28530	26960	23910	20290	19180	.55	15620	13020	.66
21	27170	25680	22770	19320	18270	.61	14880	12400	.73
22	25940	24510	21730	18450	17440	.67	14200	11840	.80
23	24810	23450	20790	17640	16680	.73	13580	11320	.88
24	23780	22470	19920	16910	15990	.79	13020	10850	.95
25	22830	21570	19130	16230	15350	.86	12500	10420	1.03
26	21950	20740	18390	15610	14760	.93	12020	10020	1.12
27	21140	19970	17710	15030	14210	1.00	11570	9650	1.21
28	20380	19260	17080	14490	13700	1.08	11160	9300	1.30
29	19680	18600	16490	13990	13230	1.16	10770	8980	1.39
30	19020	17980	15940	13530	12790	1.24	10410	8680	1.49
31	18410	17400	15420	13090	12380	1.33	10080	8400	1.59
32	17830	16850	14940	12680	11990	1.41	9760	8140	1.69
33	17290	16340	14490	12300	11630	1.50	9470	7890	1.80
34	16780	15860	14060	11940	11280	1.59	.....	.....	.....
35	16300	15410	13660	11590	10960	1.69	.....	.....	.....
36	15850	14980	13280	11270	10660	1.79	.....	.....	.....

For safe loads below heavy lines the deflection will be greater than the allowable limit for plaster ceiling.

STANDARD STEEL I BEAMS

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

Safe loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of beam.

D=the deflections in inches under the safe load.

For safe loads and deflections under various systems of loading, see explanation.

Distance Between Supports in Feet	9" I			8" I			7" I		
	35 Pounds	21 Pounds	D	25½ Pounds	18 Pounds	D	20 Pounds	15 Pounds	D
2	132490	100660	.004	91250	75850	.005	64280	55200	.01
3	88330	67100	.01	60830	50560	.01	42850	36800	.02
4	66240	50320	.03	45620	37920	.03	32140	27600	.04
5	52990	40320	.05	36500	30330	.05	25710	22080	.06
6	44160	33600	.07	30410	25280	.07	21430	18400	.09
7	37850	28800	.09	26070	21670	.10	18370	15770	.12
8	33120	25160	.12	22810	18960	.13	16070	13800	.15
9	29440	22370	.15	20270	16850	.17	14280	12270	.19
10	26500	20130	.18	18250	15170	.21	12860	11040	.24
11	24090	18300	.22	16590	13790	.25	11690	10040	.29
12	22080	16770	.26	15200	12640	.30	10710	9200	.34
13	20380	15480	.31	14110	11670	.35	9890	8490	.40
14	18930	14380	.36	13030	10830	.41	9180	7890	.46
15	17670	13420	.41	12160	10110	.47	8570	7360	.53
16	16560	12580	.47	11400	9480	.53	8030	6900	.60
17	15590	11840	.53	10760	8920	.60	7560	6490	.68
18	14720	11180	.60	10130	8430	.67	7140	6130	.77
19	13950	10590	.66	9620	7980	.75	6770	5810	.85
20	13250	10064	.74	9120	7580	.83	6430	5520	.95
21	12620	9590	.81	8700	7220	.91	6120	5260	1.04
22	12050	9150	.89	8290	6890	1.00	5840	5020	1.14
23	11520	8750	.97	7940	6590	1.09	5590	4800	1.25
24	11040	8390	1.06	7600	6320	1.19	5360	4600	1.36
25	10600	8050	1.15	7320	6070	1.29	.....	.....	.....
26	10190	7740	1.24	7050	5830	1.40	.....	.....	.....
27	9810	7460	1.34	.....	.....	.....	.....	.....	.....
28	9460	7190	1.44	.....	.....	.....	.....	.....	.....

Safe loads above light lines are greater than safe loads for web crippling.

For safe loads below heavy lines the deflection will be greater than the allowable limit for plaster ceiling.

For safe loads above dotted lines standard connections will not be of sufficient strength.

STANDARD STEEL I BEAMS

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

fe loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of beam.

D=the deflection in inches under the safe load.

For safe loads and deflections under various systems of loading, see explanation.

ce en rts	6″ I			5″ I			4″ I			3″ I	
	17¼ Pounds	12¼ Pounds	D	17 Pounds	9¼ Pounds	D	7½ Pounds	D		5½ Pounds	D
	46550	38750	.01	39990	25800	.01	15900	.02		8800	.02
	31030	25830	.02	26660	17200	.03	10600	.04		5860	.05
	23280	19370	.04	19990	12900	.05	7950	.07		4410	.09
	18620	15490	.07	15990	10320	.08	6360	.10		3530	.14
	15520	12910	.10	13330	8600	.12	5300	.15		2940	.20
	13300	11070	.13	11420	7370	.16	4540	.20		2520	.27
	11640	9680	.18	9990	6450	.21	3980	.26		2210	.35
	10350	8610	.22	8880	5730	.27	3530	.34		1960	.45
	9310	7750	.28	7990	5160	.33	3180	.41		1770	.55
	8460	7040	.33	7360	4690	.40	2890	.50		1600	.67
	7760	6460	.40	6660	4300	.48	2650	.60		1470	.80
	7160	5960	.47	6150	3970	.56	2450	.70		1360	.93
	6650	5530	.54	5710	3680	.65	2270	.81		1260	1.08
	6210	5160	.62	5330	3440	.75	2120	.93		1180	1.24
	5820	4840	.71	4990	3220	.85	1990	1.06		1100	1.41
	5480	4560	.80	4700	3030	.95	1870	1.19		1040	1.59
	5170	4300	.90	4440	2870	1.07	1770	1.34		980	1.79
	4900	4080	1.00	4210	2720	1.19					
	4660	3870	1.10	3990	2580	1.32					
	4430	3690	1.21								
	4230	3520	1.33								

fe loads above light lines are greater than safe loads for web ling.

r safe loads below heavy lines the deflection will be greater the allowable limit for plaster ceiling.

r safe loads above dotted lines standard connections will not sufficient strength.

STANDARD STEEL CHANNELS

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

Safe loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of channel.

D=the deflection in inches under the safe load.

For safe loads and deflections under various systems of loading, see explanation.

Distance Between Supports in Feet	15″ I					13″ I			
	55 Pounds	50 Pounds	40 Pounds	33 Pounds	D	50 Pounds	40 Pounds	32 Pounds	D
10	61190	57270	49420	44450	.11	51470	44670	38970	.12
11	55630	52060	44930	40410	.13	46790	40610	35420	.15
12	50990	47720	41190	37040	.16	42890	37220	32470	.18
13	47070	44050	38020	34190	.19	39590	34360	29970	.21
14	43710	40910	35300	31750	.22	36760	31910	27830	.24
15	40790	38130	32950	29630	.26	34310	29780	25980	.28
16	38240	35790	30890	27780	.29	32160	27920	24350	.32
17	35990	33690	29070	26150	.32	30270	26270	22920	.36
18	33990	31820	27460	24700	.36	28590	24810	21650	.41
19	32210	30140	26010	23400	.40	27090	23510	20510	.46
20	30590	28630	24710	22230	.44	25730	22330	19480	.51
21	29140	27270	23540	21170	.49	24510	21270	18550	.56
22	27810	26030	22470	20210	.53	23390	20300	17710	.61
23	26600	24900	21490	19330	.58	22370	19420	16940	.67
24	25500	23860	20590	18520	.64	21440	18610	16230	.73
25	24480	22910	19770	17780	.69	20580	17860	15580	.79
26	23530	22030	19010	17100	.75	19790	17180	14980	.86
27	22660	21210	18310	16460	.81	19060	16540	14430	.92
28	21850	20450	17650	15880	.88	18350	15950	13910	.99
29	21100	19750	17040	15330	.93	17740	15400	13440	1.07
30	20400	19090	16470	14820	.99	17150	14890	12990	1.14

For safe loads below heavy lines the deflection will be greater than the allowable limit for plaster ceiling.

STANDARD STEEL CHANNELS

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

fe loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of channel.

D=the deflection in inches under the safe load.

For safe loads and deflections under various systems of loading, see explanation.

nce em orts t	12″ [				10″ [			
	40 Pounds	30 Pounds	20½ Pounds	D	35 Pounds	25 Pounds	15 Pounds	D
	35010	28740	22780	.14	24640	19410	14270	.17
	31830	26120	20700	.17	22400	17640	12970	.20
	29180	23950	18980	.20	20530	16170	11890	.24
	26930	22110	17520	.23	18950	14930	10980	.28
	25010	20530	16270	.27	17600	13860	10190	.32
	23340	19160	15180	.31	16430	12940	9510	.37
	21880	17960	14230	.35	15400	12130	8920	.42
	20600	16900	13400	.40	14490	11420	8390	.48
	19450	15970	12650	.45	13690	10780	7930	.54
	18430	15120	11990	.50	12970	10220	7510	.60
	17510	14370	11390	.55	12320	9700	7130	.66
	16670	13680	10850	.61	11730	9240	6790	.73
	15910	13060	10350	.67	11200	8820	6490	.80
	15220	12490	9900	.73	10710	8440	6200	.88
	14590	11970	9490	.79	10270	8090	5940	.95
	14000	11490	9110	.85	9860	7750	5710	1.03
	13470	11050	8760	.93	9480	7460	5490	1.12
	12970	10640	8440	1.01	9130	7190	5280	1.21
	12500	10260	8130	1.09	8800	6930	5100	1.30
	12070	9910	7850	1.16	8500	6690	4920	1.39
	11670	9580	7590	1.24	8210	6470	4760	1.49

or safe loads below heavy lines the deflection will be greater n the allowable limit for plaster ceiling.

STANDARD STEEL CHANNELS

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

Safe loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of channel.

D=the deflection in inches under the safe load.

For safe loads and deflections under various systems of loading, see explanation.

Distance Between Supports in Feet	9" [			8" [			7" [		
	25 Pounds	13¼ Pounds	D	21¼ Pounds	11½ Pounds	D	19¾ Pounds	9¾ Pounds	D
2	83790	56080	.004	63680	43070	.005	50550	32130	.01
3	55860	37390	.01	42450	28710	.01	33700	21420	.02
4	41900	28040	.03	31840	21530	.03	25280	16070	.04
5	33520	22430	.05	25470	17230	.05	20220	12850	.06
6	27930	18690	.07	21230	14360	.07	16850	10710	.09
7	23940	16020	.09	18200	12310	.10	14440	9180	.12
8	20950	14020	.12	15920	10770	.13	12640	8030	.15
9	18620	12460	.15	14150	9570	.17	11230	7140	.19
10	16760	11220	.18	12740	8610	.21	10110	6430	.24
11	15240	10200	.21	11580	7830	.25	9190	5840	.29
12	13970	9350	.26	10610	7180	.30	8430	5360	.34
13	12890	8630	.31	9800	6630	.35	7780	4940	.40
14	11970	8010	.36	9100	6150	.41	7220	4590	.46
15	11170	7480	.41	8490	5740	.47	6740	4280	.53
16	10470	7010	.47	7960	5380	.53	6320	4020	.61
17	9860	6600	.53	7490	5070	.60	5950	3780	.68
18	9310	6230	.60	7080	4790	.67	5620	3570	.77
19	8820	5900	.66	6700	4530	.75	5320	3380	.85
20	8380	5610	.74	6370	4310	.83	5060	3210	.95
21	7980	5340	.81	6070	4100	.91	4810	3060	1.03
22	7620	5100	.89	5790	3920	1.01	4600	2920	1.14
23	7290	4880	.97	5540	3750	1.09	4400	2790	1.25
24	6980	4670	1.06	5310	3590	1.19	4210	2680	1.36
25	6700	4490	1.15	5090	3450	1.29	4040	.....	1.47
26	6440	4310	1.24	.....	.....	.....	.....	.....	.....
27	6200	4150	1.34	.....	.....	.....	.....	.....	.....

For safe loads below heavy lines the deflection will be greater than the allowable limit for plaster ceiling.

STANDARD STEEL CHANNELS

AFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

e loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of channel.

D=the deflection in inches under the safe load.

For safe loads and deflections under various systems of loading, see explanation.

6″ [			5″ [			4″ [		3″ [	
15½ Pounds	8 Pounds	D	11½ Pounds	6½ Pounds	D	5¼ Pounds	D	4 Pounds	D
34720	23100	.01	22190	15820	.01	10110	.02	5810	.02
23140	15400	.02	14790	10540	.03	6770	.04	3870	.05
17360	11550	.04	11100	7910	.05	5060	.07	2910	.09
13890	9240	.07	8880	6330	.08	4050	.10	2330	.14
11570	7700	.10	7400	5270	.12	3370	.15	1940	.20
9920	6600	.14	6340	4520	.16	2890	.20	1660	.27
8680	5780	.18	5550	3960	.21	2530	.26	1450	.35
7720	5130	.22	4930	3520	.27	2250	.34	1290	.45
6940	4620	.28	4440	3160	.33	2020	.41	1160	.55
6310	4200	.33	4040	2880	.40	1840	.50	1060	.67
5790	3850	.40	3700	2640	.48	1690	.59	970	.80
5340	3550	.47	3410	2430	.56	1560	.70	890	.93
4960	3300	.54	3170	2260	.65	1440	.81	830	1.08
4630	3080	.62	2960	2110	.74	1350	.93	780	1.24
4340	2890	.71	2770	1980	.85	1260	1.06	730	1.41
4080	2720	.79	2610	1860	.96	1190	1.20	680	1.60
3860	2570	.89	2470	1760	1.07	1120	1.34	650	1.79
3650	2430	1.00	2340	1670	1.20	1060	1.49	.....	....
3470	2310	1.10	2220	1580	1.32	.....	....	.....	....
3310	2200	1.22	2110	.....	1.45	.....	....	.....	....
3160	2100	1.34	.....	.....	....	.....	....	.....	....
3020	.....	1.45	.....	.....	....	.....	....	.....	....
.....	.....	....	.....	.....	....	.....	....	.....	....
.....	.....	....	.....	.....	....	.....	....	.....	....
.....	.....	....	.....	.....	....	.....	....	.....	....
.....	.....	....	.....	.....	....	.....	....	.....	....

safe loads below heavy lines the deflection will be greater he allowable limit for plaster ceiling.

STANDARD STEEL ANGLES

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

FOR EQUAL LEG ANGLES

Safe loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of angle.

NEUTRAL AXIS PARALLEL TO EITHER LEG

For safe loads and deflections under various systems of loading, see explanation.

Size of Angle, Inches	Weight per Foot	Distance between Supports in Feet						
		1	2	3	4	5	6	7
8 ×8 ×1	51.00	.....	84240	56160	42120	33700	28080	24070
7/8	45.00	.....	74740	49840	37370	29900	24920	21360
3/4	38.90	.....	64980	43320	32490	25990	21660	18570
5/8	32.70	.....	54940	36620	27470	21980	18310	15700
1/2	26.40	89240	44620	29760	22310	17850	14880	12750
6 ×6 ×7/8	33.10	81440	40720	27150	20360	16290	13570	11630
3/4	28.70	71180	35540	23690	17770	14220	11850	10150
5/8	24.20	60340	30170	20120	15090	12070	10060	8620
1/2	19.60	49220	24610	16400	12300	9840	8200	7030
3/8	14.90	37640	18820	12550	9410	7530	6270	5380
5 ×5 ×3/4	23.60	48320	24160	16100	12080	9660	8050	6900
5/8	20.00	41140	20570	13710	10280	8230	6860	5880
1/2	16.20	33660	16830	11220	8410	6730	5610	4810
3/8	12.30	25820	12910	8610	6460	5170	4310	3690
4 ×4 ×5/8	15.70	25620	12810	8540	6410	5130	4270	3660
1/2	12.80	21060	10530	7020	5270	4210	3510	3010
3/8	9.80	16240	8120	5420	4060	3250	2710	2320
5/16	8.20	13740	6870	4580	3430	2750	2290	1960
3½×3½× 1/2	11.10	15880	7940	5290	3970	3180	2650	2270
3/8	8.50	12280	6140	4100	3070	2460	2050	1760
1/4	5.80	8640	4320	2880	2160	1720	1440	1230
3 ×3 ×1/2	9.40	11440	5720	3810	2860	2290	1910	1630
3/8	7.20	8880	4440	2960	2220	1780	1480	1270
5/16	6.10	7540	3770	2510	1890	1510	1260	1080
1/4	4.90	6160	3080	2050	1540	1230	1030	880
2¾×2¾×1/2	8.50	9480	4740	3160	2370	1900	1580	1360
5/16	5.60	6280	3140	2090	1570	1260	1050	900
5/16	3.39	3940	1970	1310	980	790	660	560
2½×2½×3/8	5.90	6040	3020	2010	1510	1210	1010	860
5/16	3.07	3220	1610	1080	810	650	540	460
2¼×2¼×3/8	5.30	4820	2410	1610	1210	960	800	690
5/16	2.75	2600	1300	870	650	520	430	370
2 ×2 ×3/8	4.70	3740	1870	1250	940	750	620	540
5/16	2.44	2040	1020	680	510	410	340	290

For lengths to the right of heavy lines the deflection will be greater than 1/16 inch.

STANDARD STEEL ANGLES

AFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

FOR EQUAL LEG ANGLES

loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of angle.

NEUTRAL AXIS PARALLEL TO EITHER LEG

For safe loads and deflections under various systems of loading, see explanation.

of le, es	Distance between Supports in Feet							
	8	9	10	11	12	13	14	15
×1	21060	18720	16850	15320	14040	12960	12030	11230
7/8	18600	16610	14950	13590	12460	11500	10680	9970
3/4	16250	14440	13000	11820	10830	10000	9280	8660
5/8	13740	12210	10990	9990	9160	8450	7850	7330
1/2	11160	9920	8930	8110	7440	6870	6380	5950
× 7/8	10180	9050	8140	7400	6790	6260	5820	5430
3/4	8890	7900	7110	6460	5920	5470	5080	4740
5/8	7540	6710	6030	5490	5030	4640	4310	4020
1/2	6150	5470	4920	4470	4100	3790	3520	3280
3/8	4700	4180	3760	3420	3140	2900	2690	2510
× 3/4	6040	5360	4830	4390	4020	3710	3450	3220
5/8	5140	4570	4110	3740	3430	3160	2940	2740
1/2	4210	3740	3370	3060	2800	2590	2400	2240
3/8	3230	2870	2580	2350	2150	1990	1850	1720
× 5/8	3200	2850	2560	2330	2140	1970	1830	1710
1/2	2630	2340	2110	1910	1760	1620	1500	1400
3/8	2030	1810	1620	1480	1350	1250	1160	1080
1/4	1720	1530	1370	1250	1140	1060	980	920
× 1/2	1980	1760	1590	1440	1320	1220	1130	1060
3/8	1540	1370	1230	1120	1020	950	880	820
1/4	1080	.960	860	780	720	660	610	570
× 1/2	1430	1270	1140	1040	950	.....	.....	.....
3/8	1110	990	890	810	740	.....	.....	.....
5/16	940	840	750	690	630	.....	.....	.....
1/4	770	680	620	560	510	.....	.....	.....
× 1/2	1190	1050	950	860	790	.....	.....	.....
1/4	790	700	630	570	520	.....	.....	.....
3/16	490	440	390	360	330	.....	.....	.....
× 3/8	760	670	600	550	500	.....	.....	.....
3/16	400	360	320	290	270	.....	.....	.....
× 3/8	600	540	480	440	400	.....	.....	.....
3/16	320	290	260	240	220	.....	.....	.....
× 3/8	470	420	370	.....	.....	.....	.....	.....
3/16	250	230	200	.....	.....	.....	.....	.....

lengths to the right of heavy lines the deflection will be than $\frac{3}{16}$ inch.

lengths to the right of the dotted line the deflection will be than $\frac{3}{8}$ inch.

STANDARD STEEL ANGLES

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

FOR UNEQUAL LEG ANGLES

Safe loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of angle.

LONG LEG VERTICAL

For safe loads and deflections under various systems of loading, see explanation.

Size of Angle, Inches	Weight per Foot	Distance between Supports in Feet						
		1	2	3	4	5	6	7
8 × 6 × 1	33.80	.....	62220	41480	31110	24880	20740	17770
7/8	28.50	.....	53620	35080	26310	21050	17540	15040
3/4	23.09	85480	42740	28490	21370	17090	14250	12210
7 × 3½ × 5/8	21.09	74280	37140	24760	18570	14850	12380	10610
1/2	17.09	60540	30280	20180	15140	12120	10100	8650
3/8	13.00	46180	23080	15390	11540	9220	7690	6580
6 × 4 × 5/8	20.00	56640	28320	18880	14160	11320	9440	8080
1/2	16.20	46340	23120	15410	11560	9250	7710	6600
3/8	12.30	35400	17700	11800	8850	7080	5900	5060
6 × 3½ × 5/8	18.90	55340	27670	18450	13840	11070	9230	7910
1/2	15.30	45200	22600	15060	11300	9040	7530	6460
3/8	11.70	34600	17300	11540	8650	6920	5770	4940
5 × 4 × 1/2	14.50	32500	16280	10850	8140	6510	5430	4650
3/8	11.00	25000	12500	8330	6250	5000	4170	3570
5 × 3½ × 1/2	13.60	31980	15990	10620	7980	6370	5310	4550
7/16	8.70	20640	10320	6880	5160	4130	3440	2950
5 × 3 × 1/2	12.80	31020	15510	10340	7760	6210	5170	4430
7/16	8.28	20120	10160	6710	5030	4020	3350	2870
4½ × 3 × 1/2	11.90	25320	12660	8440	6320	5060	4220	3620
7/16	7.70	16420	8210	5470	4100	3280	2730	2340
4 × 3½ × 1/2	11.90	20640	10320	6880	5160	4130	3440	2950
7/16	7.70	13460	6740	4490	3370	2690	2250	1920
4 × 3 × 1/2	11.10	20140	10070	6710	5040	4030	3360	2880
7/16	7.20	13160	6580	4390	3290	2630	2190	1880
3½ × 3 × 1/2	10.20	15500	7750	5170	3880	3100	2580	2220
3/8	5.40	8420	4210	2800	2100	1680	1400	1200
3½ × 2½ × 1/2	9.40	15000	7520	5000	3760	3010	2510	2150
3/8	4.90	8040	4020	2680	2010	1610	1340	1150
3 × 2½ × 3/8	6.00	8040	4320	2880	2160	1730	1440	1230
1/4	4.50	5800	2880	2880	1500	1200	1000	860
3 × 2 × 3/8	5.90	8340	4170	2780	2080	1670	1390	1190
1/4	4.10	5780	2900	1930	1440	1160	960	830

For lengths to the right of heavy lines the deflection will be greater than 1/10 inch.

STANDARD STEEL ANGLES

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

FOR UNEQUAL LEG ANGLES

Safe loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of angle.

LONG LEG VERTICAL

For safe loads and deflections under various systems of loading, see explanation.

Size of Angle, Inches	Distance between Supports in Feet							
	8	9	10	11	12	13	14	15
6×3½	15550	13820	12440	11310	10370	9570	8880	8290
⅝	13150	11690	10520	9570	8770	8090	7510	7010
½	10680	9500	8550	7770	7120	6570	6100	5700
5×3½	9280	8250	7430	6750	6190	5710	5310	4950
½	7570	6730	6060	5510	5050	4660	4330	4040
⅜	5770	5130	4610	4190	3840	3550	3290	3070
5×3	7080	6290	5660	5150	4720	4360	4050	3780
½	5780	5140	4620	4200	3850	3560	3300	3080
⅜	4420	3930	3540	3220	2950	2720	2530	2360
5×2½	6920	6150	5530	5030	4610	4260	3950	3690
½	5650	5020	4520	4110	3770	3480	3230	3010
⅜	4330	3850	3460	3150	2880	2660	2470	2310
4×3½	4070	3620	3260	2960	2710	2500	2330	2170
⅜	3120	2780	2500	2270	2080	1920	1790	1670
4×3	3980	3540	3190	2900	2650	2450	2280	2120
⅜	2580	2290	2060	1880	1720	1590	1470	1380
4×2½	3880	3450	3100	2820	2590	2390	2220	2070
⅜	2520	2240	2010	1830	1680	1550	1440	1340
4×2	3170	2810	2530	2300	2110	1950	1810	1690
⅜	2050	1820	1640	1490	1360	1260	1170	1090
3½×3	2580	2290	2060	1880	1720	1590	1470	1380
⅜	1680	1500	1350	1220	1120	1040	960	900
3½×2½	2520	2240	2010	1830	1680	1550	1440	1340
⅜	1640	1460	1320	1200	1100	1010	940	880
3½×2	1940	1720	1550	1410	1290	1190	1110	1030
¼	1050	930	840	760	700	640	600	560
3½×1½	1880	1670	1510	1370	1250	1160	1080	1000
¼	1010	890	800	730	670	620	570	540
3½×3/16	1080	960	860	790	720	660	620	.....
¼	750	670	600	540	500	460	430	.....
3×2½	1040	930	830	760	690	.....	.....	.....
¼	720	640	580	530	480	.....	.....	.....

For lengths to the right of heavy lines the deflection will be greater than $\frac{3}{16}$ inch.

For lengths to the right of the dotted line the deflection will be greater than $\frac{3}{8}$ inch.

STANDARD STEEL ANGLES

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

FOR UNEQUAL LEG ANGLES

Safe loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of angle.

SHORT LEG VERTICAL

For safe loads and deflections under various systems of loading, see explanation.

Size of Angle, Inches	Weight per Foot	Distance between Supports in Feet						
		1	2	3	4	5	6	7
8 × 6 × 1	33.80	73840	36920	24610	18460	14770	12310	10550
½	28.50	62680	31340	20890	15670	12530	10440	8950
⅜	23.00	55080	27540	18360	12770	10210	8510	7290
7 × 3½ × ½	21.00	21040	10520	7010	5260	4210	3510	3010
⅜	17.00	17280	8640	5760	4320	3460	2880	2470
¼	13.00	13070	6980	4650	3490	2790	2329	1990
6 × 4 × ½	20.00	27040	13520	9020	6760	5410	4510	3860
⅜	16.20	22200	11100	7400	5550	4440	3700	3170
¼	12.30	17100	8550	5700	4280	3420	2850	2440
6 × 3½ × ½	18.90	20880	10340	6890	5170	4140	3450	2950
⅜	15.30	17000	8500	5670	4250	3400	2830	2430
¼	11.70	13140	6570	4380	3280	2630	2190	1880
5 × 4 × ½	18.50	21720	10860	7240	5430	4340	3620	3100
⅜	14.00	16740	8370	5580	4180	3350	2790	2390
5 × 3½ × ½	17.60	16640	8320	5550	4160	3330	2770	2380
⅜	13.40	12900	6450	4300	3220	2580	2150	1840
5 × 3 × ½	16.90	12220	6110	4070	3060	2440	2040	1750
⅜	12.80	9040	4520	3010	2260	1810	1510	1290
4½ × 3 × ½	16.20	12080	6040	4020	3020	2410	2010	1720
⅜	12.30	8940	4470	2980	2235	1790	1490	1280
4 × 3½ × ½	15.30	11880	5940	3960	2970	2380	1980	1700
⅜	11.70	8640	4320	2880	2160	1730	1440	1230
4 × 3 × ½	14.60	11540	5770	3850	2890	2310	1925	1650
⅜	11.10	8340	4170	2780	2085	1670	1390	1190
4 × 2½ × ½	13.90	11200	5600	3730	2800	2240	1870	1600
⅜	10.60	8040	4020	2680	2010	1610	1340	1150
3½ × 3 × ½	13.90	10920	5460	3640	2730	2180	1820	1560
⅜	10.60	7740	3870	2580	1935	1550	1290	1110
3½ × 2½ × ½	12.90	10560	5280	3520	2640	2110	1760	1510
⅜	9.80	7440	3720	2480	1860	1490	1240	1060
3 × 2½ × ½	12.20	10200	5100	3400	2550	2040	1700	1460
⅜	9.30	7140	3570	2380	1785	1430	1190	1020
3 × 2 × ½	11.50	9840	4920	3280	2460	1970	1640	1410
⅜	8.80	6840	3420	2280	1710	1370	1140	980
¼	6.00	4560	2280	1520	1140	910	760	650

For lengths to the right of heavy lines the deflection will be greater than $\frac{3}{16}$ inch.

STANDARD STEEL ANGLES

E LOADS IN POUNDS UNIFORMLY DISTRIBUTED

FOR UNEQUAL LEG ANGLES

oads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of angle.

SHORT LEG VERTICAL

For safe loads and deflections under various systems of loading, see explanation.

	Distance between Supports in Feet							
	8	9	10	11	12	13	14	15
3½ × 3½	9230	8200	7380	6710	6150	5680	5270	4920
⅝	7830	6960	6260	5690	5220	4820	4470	4170
½	6380	5670	5100	4640	4250	3920	3640	3400
3½ × 3	2630	2340	2100	1910	1750	1620	1500	1400
½	2160	1920	1730	1570	1440	1330	1230	1150
⅜	1740	1550	1390	1270	1160	1070	990	930
⅝	3380	3010	2700	2460	2250	2080	1930	1800
½	2770	2470	2220	2020	1850	1710	1590	1480
⅜	2140	1900	1710	1550	1430	1320	1220	1140
⅝	2580	2300	2070	1880	1720	1590	1480	1380
½	2120	1890	1700	1550	1420	1310	1210	1130
⅜	1640	1460	1310	1190	1090	1010	940	870
3 × 2½	2710	2410	2170	1970	1810	1670	1550	1450
⅜	2090	1860	1670	1520	1390	1290	1200	1120
3 × 2½	2080	1850	1660	1510	1390	1280	1190	.....
5/16	1360	1210	1090	990	910	840	780	.....
3 × 2½	1530	1360	1220	1110	1020	940	870	.....
5/16	1000	890	800	730	670	620	570	.....
3 × 2½	1510	1340	1210	1100	1010	930	860	.....
5/16	1010	900	810	730	670	620	570	.....
3 × 2½	2020	1800	1620	1470	1350	1240	1160	.....
5/16	1320	1180	1060	960	880	820	760	.....
3 × 2½	1490	1320	1190	1080	990	910	850	.....
5/16	980	870	780	710	650	600	560	.....
3 × 2½	1460	1300	1170	1060	970	900	830	.....
¼	960	860	770	700	640	590	550	.....
3 × 2½	1010	900	810	740	680	.....	.....	.....
¼	550	490	440	400	370	.....	.....	.....
3 × 2½	770	690	620	560	520	.....	.....	.....
¼	540	480	430	390	360	.....	.....	.....
3 × 2½	500	440	400	360	330	.....	.....	.....
¼	350	310	280	250	230	.....	.....	.....

engths to the right of heavy lines the deflection will be than 1/16 inch.

engths to the right of the dotted line the deflection will be than 3/8 inch.

STANDARD STEEL TEES

SAFE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

Safe loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of tee.

NEUTRAL AXIS PARALLEL TO FLANGE

For safe loads and deflections under various systems of loading, see explanation.

Size of Tee Flange by Stem F×S	Wt. per Foot	Thickness at Edge		Distance between Supports in Feet									
		Flange	Stem	1	2	3	4	5	6	7	8	9	10
5 ×3	13.4	½	½	12580	6290	4190	3140	2510	2090	1790	1570	1390	1250
5 ×2½	10.9	⅜	7/16	9160	4580	3050	2290	1830	1520	1300	1140	1010	910
4½×3½	15.7	7/16	11/16	22710	11350	7570	5670	4540	3780	3240	2830	2520	2270
4½×3	9.8	⅜	⅜	10020	5010	3340	2500	2000	1670	1430	1250	1110	1000
	8.4	7/16	7/16	8620	4310	2870	2150	1720	1450	1230	1070	950	860
4½×2½	9.2	⅜	⅜	6930	3460	2310	1730	1380	1150	990	860	770	690
	7.8	7/16	7/16	5970	2980	1990	1490	1190	990	850	740	660	590
4 ×5	15.3	½	½	33060	16530	11020	8260	6610	5510	4720	4130	3670	3300
	11.9	⅝	⅝	25910	12950	8630	6470	5180	4310	3700	3230	2870	2590
4 ×4½	14.4	½	½	27190	13590	9060	6790	5430	4530	3880	3390	3020	271
	11.2	⅝	⅝	10450	5220	3480	2610	2090	1740	1490	1300	1160	104
4 ×4	16.9	½	½	27720	13860	9240	6930	5540	4620	3960	3460	3080	2770
	13.5	½	½	21546	10770	7180	5380	4300	3590	3070	2690	2390	2150
	12.4	7/16	7/16	20580	10290	6860	5140	4110	3430	2940	2570	2280	2050
	10.5	⅝	⅝	17490	8740	5830	4370	3490	2910	2490	2180	1940	1740
4 ×3	9.2	⅜	⅜	9380	4690	3120	2340	1870	1560	1340	1170	1040	930
	7.8	7/16	7/16	7670	3830	2550	1910	1530	1270	1090	950	850	760
4 ×2½	8.5	⅜	⅜	6610	3300	2200	1650	1320	1100	930	820	730	660
	7.2	7/16	7/16	5860	2930	1950	1460	1170	970	830	730	650	580
4 ×2	7.8	⅜	⅜	4260	2130	1420	1060	850	710	600	530	470	420
	6.7	7/16	7/16	3620	1810	1200	900	720	600	510	450	400	360
3½×4	12.6	½	½	21110	10550	7030	5270	4220	3510	3010	2630	2340	2110
	9.8	⅝	⅝	16530	8260	5510	4130	3300	2750	2360	2060	1830	1650
3½×3	10.8	½	½	12050	6020	4010	3010	2410	2000	1720	1500	1330	1200
	8.5	⅝	⅝	9380	4690	3120	2340	1870	1560	1340	1170	1040	930
	7.5	7/16	7/16	7680	3840	2560	1920	1530	1280	1090	960	850	760
3 ×4	11.7	½	½	20690	10340	6890	5170	4130	3440	2950	2580	2290	2060
	9.2	⅝	⅝	16740	8370	5580	4180	3340	2790	2390	2090	1860	1670
3 ×3½	10.8	½	½	15890	7940	5290	3970	3170	2640	2270	1980	1760	1580
	8.5	⅝	⅝	12900	6450	4300	3220	2580	2150	1840	1610	1430	1290
3 ×3	9.9	½	½	11730	5860	3910	2930	2340	1950	1670	1460	1300	1170
	7.8	⅝	⅝	9170	4580	3050	2290	1830	1520	1310	1140	1130	910
	6.7	7/16	7/16	7890	3940	2630	1970	1570	1310	1120	980	870	780
	5.7	¼	¼	6610	3300	2200	1650	1320	1100	940	820	730	660

For lengths to the right of heavy lines the deflection will be greater than 1/16 inch.

STANDARD STEEL TEES

FE LOADS IN POUNDS UNIFORMLY DISTRIBUTED

loads are figured for a fiber stress of 16,000 pounds per square inch, and include the weight of tee.

NEUTRAL AXIS PARALLEL TO FLANGE

For safe loads and deflections under various systems of loading, see explanation.

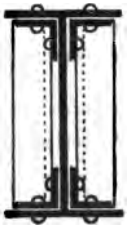
F BY	Wt. per Foot	Thickness at Edge		Distance between Supports in Feet									
		Flange	Stem	1	2	3	4	5	6	7	8	9	10
1½	7.1	3/8	3/8	6390	3190	2130	1590	1270	1060	910	790	710	630
	6.1	5/16	5/16	5540	2770	1840	1380	1100	920	790	690	610	550
	5.0	1/4	1/4	4790	2390	1590	1190	950	790	680	590	530	470
	7.1	3/8	3/8	9270	4630	3090	2310	1850	1540	1320	1150	1030	920
	6.1	5/16	5/16	8100	4050	2700	2020	1620	1350	1150	1010	900	810
1½	6.4	3/8	3/8	6500	3250	2160	1620	1300	1080	920	810	720	650
	5.5	5/16	5/16	5540	2770	1840	1380	1100	920	790	690	610	550
	4.8	5/16	5/16	3410	1750	1130	850	680	560	480	420	370	340
1¼	3.9	1/4	1/4	2020	1010	670	500	400	330	280	250	220	200
1¼	2.8	1/4	1/4	850	420	280	210	170	140	120	100	90	80
1¼	4.9	5/16	5/16	4470	2230	1490	1110	890	740	630	550	490	440
	4.1	1/4	1/4	3410	1700	1130	850	680	560	480	420	370	340
	4.3	5/16	5/16	3510	1750	1170	870	700	580	500	430	390	350
	3.5	1/4	1/4	2660	1330	880	660	530	440	380	330	290	260
1½	3.09	1/4	1/4	1590	790	530	390	310	260	220	190	170	150
1¼	3.09	1/4	1/4	2020	1010	670	500	400	330	280	250	220	200
	2.33	1/4	1/4	1380	690	460	340	270	230	190	170	150	130
	2.45	1/4	1/4	2040	1020	680	510	400	340	290	250	220	200
1½	2.47	1/4	1/4	1490	740	490	370	290	240	210	180	160	140
	1.94	1/4	1/4	1170	580	390	290	230	190	160	140	130	110
1¼	1.25	1/8	1/8	510	250	170	120	100	80	70	60	50	50
1¼	2.02	1/4	1/4	1000	530	350	260	210	170	150	130	110	100
	1.59	1/8	1/8	740	370	240	180	140	120	100	90	80	70
	1.09	1/8	1/8	420	210	140	100	80	70	60	50	....	....
1¼	1.37	1/8	1/8	620	310	200	150	120	100	80	70	....	....
	0.97	1/8	1/8	390	190	130	90	70	60	50	....	....	....
	1.53	1/4	1/4	630	310	210	150	120	100	90	....	....	....
	1.25	1/8	1/8	500	250	160	120	100	80	70	....	....	....
	0.89	1/8	1/8	360	180	120	90	70	60	50	....	....	....
1	0.73	1/4	1/4	280	140	90	70	50	40	....	....	....	....
1	0.61	1/8	1/8	200	100	60	50	40	....	....	....	....	....
1	0.50	1/8	1/8	120	60	40	30	....	....	....	....	....	....
1	0.34	1/8	1/8	40	20	....	....	....	....	....	....	....	....

lengths to the right of heavy lines the deflection will be greater 1/4 inch.

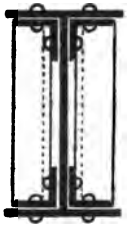
SAFE LOADS

IN TONS OF 2000 POUNDS UNIFORMLY DISTRIBUTED FOR

STEEL PLATE GIRDERS



36″×½″ Web Plate
12″×⅜″ Flange Plates
5″×3½″×½″ Angles



42″×⅜″ Web Plate
14″×⅜″ Flange Plates
6″×6″×⅞″ Angles

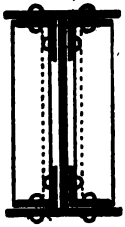
Distance, Center to Center of Bearings, Feet	Safe Load, Including Weight of Girder, Tons	Weight of Girder, Tons	Increase in Safe Load for ¼″ Increase in Thickness of Flange Plates	Increase in Weight of Girder for ¼″ Increase in Thickness of Flange Plates	Safe Load, Including Weight of Girder, Tons	Weight of Girder, Tons	Increase in Safe Load for ¼″ Increase in Thickness of Flange Plates	Increase in Weight of Girder for ¼″ Increase in Thickness of Flange Plates
20	126.24	1.77	5.90	.05	187.74	2.72	8.25	.06
21	120.23	1.85	5.63	.05	178.80	2.84	7.85	.06
22	114.76	1.92	5.37	.06	170.67	2.95	7.49	.07
23	109.77	2.04	5.14	.06	163.12	3.12	7.17	.07
24	105.20	2.17	4.93	.06	156.45	3.24	6.86	.07
25	100.99	2.19	4.73	.06	150.19	3.36	6.59	.07
26	97.10	2.26	4.55	.07	144.41	3.48	6.34	.08
27	93.51	2.34	4.37	.07	139.06	3.59	6.11	.08
28	90.17	2.41	4.21	.07	134.10	3.71	5.88	.08
29	87.06	2.53	4.07	.07	129.47	3.88	5.69	.09
30	84.16	2.60	3.94	.08	125.16	4.00	5.51	.09
31	81.44	2.68	3.81	.08	121.12	4.12	5.32	.09
32	78.90	2.75	3.69	.08	117.33	4.23	5.15	.10
33	76.81	2.82	3.58	.08	113.78	4.35	5.00	.10
34	74.26	2.89	3.47	.09	110.43	4.47	4.85	.10
35	72.13	2.98	3.37	.09	107.28	4.59	4.71	.10
36	70.13	3.09	3.27	.09	104.30	4.76	4.58	.11
37	68.23	3.16	3.18	.09	101.48	4.87	4.45	.11
38	66.44	3.24	3.10	.10	98.81	4.99	4.32	.11
39	64.74	3.31	3.03	.10	96.27	5.11	4.21	.12
40	63.12	3.39	2.95	.10	93.87	5.23	4.12	.12

The above values are founded on the moments of inertia of the sections using a maximum fiber strain of 16,000 pounds per square inch for steel; ⅞ inch rivet holes in both flanges deducted. Weights of girders correspond to lengths center to center of bearings and include rivet heads, stiffeners and fillers.

SAFE LOADS

IN TONS OF 2000 POUNDS UNIFORMLY DISTRIBUTED FOR

STEEL PLATE GIRDERS



30"×½" Web Plate
12"×⅜" Flange Plates
5"×3½"×½" Angles

Safe Load, Including Weight of Girder, Tons	Weight of Girder Tons	Increase in Safe Load for ¼" Increase in Thickness of Flange Plates	Increase in Weight of Girder for ¼" Increase in Thickness of Flange Plates
99.91	1.62	4.92	.05
95.15	1.69	4.67	.05
90.82	1.76	4.46	.06
86.87	1.86	4.26	.06
83.25	1.93	4.08	.06
79.92	2.01	3.92	.06
76.85	2.07	3.77	.07
74.00	2.14	3.63	.07
71.36	2.21	3.50	.07
68.90	2.31	3.38	.07
66.60	2.38	3.27	.08
64.45	2.45	3.17	.08
62.44	2.52	3.07	.08
60.55	2.59	2.97	.08
58.77	2.66	2.87	.09
57.08	2.73	2.79	.09
55.50	2.83	2.72	.09
54.00	2.90	2.65	.09
52.58	2.97	2.58	.10
51.23	3.04	2.52	.10
49.95	3.11	2.46	.10

36"×½" Web Plates
12"×¾" Flange Plates
5"×3½"×½" Angles

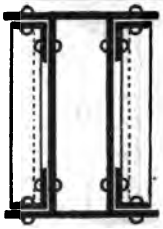
Safe Load, Including Weight of Girder, Tons	Weight of Girder, Tons	Increase in Safe Load for ¼" Increase in Thickness of Flange Plates	Increase in Weight of Girder for ¼" Increase in Thickness of Flange Plates
112.87	1.70	5.41	.05
107.49	1.77	5.13	.05
102.60	1.84	4.90	.06
98.14	1.95	4.68	.06
94.05	2.02	4.48	.06
90.29	2.09	4.31	.06
86.82	2.17	4.14	.07
83.60	2.24	3.99	.07
80.63	2.31	3.85	.07
77.84	2.42	3.71	.07
75.24	2.49	3.59	.08
72.82	2.56	3.48	.08
70.55	2.64	3.37	.08
68.41	2.71	3.26	.08
66.40	2.78	3.16	.09
64.49	2.85	3.07	.09
62.70	2.96	2.99	.09
61.01	3.03	2.91	.09
59.40	3.11	2.84	.10
57.88	3.18	2.77	.10
56.43	3.25	2.70	.10

The above values are founded on the moments of inertia of the sections
g a maximum fiber strain of 16,000 pounds per square inch for steel; ⅞ inch
holes in both flanges deducted. Weights of girders correspond to lengths
er to center of bearings and include rivet heads, stiffeners and fillers.

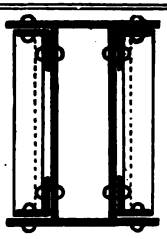
SAFE LOADS

IN TONS OF 2000 POUNDS UNIFORMLY DISTRIBUTED FOR

STEEL BOX GIRDERS



36″×½″ Web Plates
24″×$\frac{11}{16}$″ Flange Plates
4″×3½″×½″ Angles



42″×½″ Web Plates
30″×$\frac{11}{16}$″ Flange Plates
5″×4″×½″ Angles

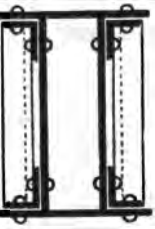
Distance, Center to Center of Bearings, Feet	Safe Load, Including Weight of Girder, Tons	Weight of Girder, Tons	Increase in Safe Load for $\frac{1}{16}$″ Increase in Thickness of Flange Plates	Increase in Weight of Girder for $\frac{1}{16}$″ Increase in Thickness of Flange Plates	Safe Load, Including Weight of Girder, Tons	Weight of Girder, Tons	Increase in Safe Load for $\frac{1}{16}$″ Increase in Thickness of Flange Plates	Increase in Weight of Girder for $\frac{1}{16}$″ Increase in Thickness of Flange Plates
20	227.5	2.92	12.92	.10	355.0	3.78	19.43	.13
21	216.7	3.06	12.30	.11	338.1	3.95	18.50	.13
22	206.9	3.19	11.74	.11	322.8	4.13	17.66	.14
23	197.9	3.36	11.23	.12	308.7	4.34	16.89	.15
24	189.6	3.49	10.76	.12	296.0	4.52	16.19	.15
25	182.0	3.63	10.33	.13	284.0	4.69	15.54	.16
26	175.0	3.76	9.94	.13	273.1	4.87	14.94	.17
27	168.5	3.89	9.57	.14	263.0	5.04	14.39	.17
28	162.6	4.03	9.22	.14	253.6	5.21	13.88	.18
29	156.9	4.15	8.91	.15	244.8	5.43	13.40	.19
30	151.7	4.33	8.61	.15	236.7	5.61	12.95	.19
31	146.8	4.45	8.33	.16	229.0	5.78	12.53	.20
32	142.2	4.60	8.07	.16	221.9	5.95	12.14	.20
33	137.9	4.74	7.83	.17	215.2	6.12	11.77	.21
34	133.8	4.87	7.60	.17	208.8	6.29	11.43	.22
35	130.0	5.00	7.38	.18	202.9	6.47	11.10	.22
36	126.4	5.17	7.17	.18	197.2	6.69	10.79	.23
37	123.0	5.31	6.98	.19	191.9	6.86	10.50	.24
38	119.7	5.44	6.80	.19	186.8	6.94	10.22	.24
39	116.7	5.58	6.62	.20	182.1	7.20	9.96	.25
40	113.8	5.71	6.46	.20	177.5	7.38	9.71	.26

The above values are founded on the moments of inertia of the sections using a maximum fiber strain of 16,000 pounds per square inch for steel; $\frac{11}{16}$ inch rivet holes in both flanges deducted. Weights of girders correspond to length center to center of bearings and include rivet heads, stiffeners and fillers.

SAFE LOADS

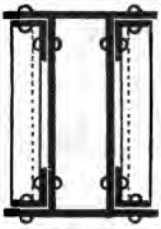
N TONS OF 2000 POUNDS UNIFORMLY DISTRIBUTED FOR

STEEL BOX GIRDERS



30″×½″ Web Plate
16″×⅜″ Flange Plates
3½″×3½″×½″ Angles

Including Weight of Girder, Tons	Weight of Girder, Tons	Increase in Safe Load for ¼″ Increase in Thickness of Flange Plates	Increase in Weight of Girder for ¼″ Increase in Thickness of Flange Plates
0.00	2.13	7.04	.07
4.28	2.23	6.70	.07
9.09	2.32	6.40	.08
4.34	2.45	6.12	.08
0.00	2.54	5.86	.08
6.00	2.64	5.63	.09
2.30	2.74	5.41	.09
8.88	2.83	5.21	.09
5.71	2.93	5.03	.10
2.76	3.06	4.85	.10
0.00	3.16	4.69	.10
7.42	3.25	4.54	.11
5.00	3.35	4.40	.11
2.72	3.50	4.26	.11
0.59	3.54	4.14	.12
8.57	3.64	4.02	.12
6.66	3.76	3.91	.12
4.86	3.86	3.80	.13
3.16	3.95	3.70	.13
1.54	4.05	3.61	.13
0.00	4.15	3.52	.14



33″×½″ Web Plates
20″×⅜″ Flange Plates
3½″×3½″×½″ Angles

Safe Load, Including Weight of Girder, Tons	Weight of Girder, Tons	Increase in Safe Load for ¼″ Increase in Thickness of Flange Plates	Increase in Weight of Girder for ¼″ Increase in in Thickness of Flange Plates
160.2	2.44	9.54	.09
152.6	2.55	9.08	.09
145.6	2.66	8.67	.09
139.3	2.80	8.29	.10
133.5	2.91	7.95	.10
128.2	3.03	7.63	.11
123.2	3.14	7.34	.11
118.7	3.25	7.07	.12
114.4	3.36	6.82	.12
110.5	3.50	6.58	.12
106.8	3.61	6.36	.13
103.3	3.72	6.15	.13
100.1	3.83	5.96	.14
97.1	3.95	5.78	.14
94.2	4.06	5.60	.14
91.5	4.17	5.44	.15
89.0	4.31	5.29	.15
86.6	4.41	5.14	.16
84.3	4.53	5.01	.16
82.1	4.65	4.88	.17
80.1	4.76	4.77	.17

above values are founded on the moments of inertia of the sections maximum fiber strain of 16,000 pounds per square inch for steel; ⅞ inch oles in both flanges deducted. Weights of girders correspond to lengths o center of bearings and include rivet heads, stiffeners and fillers.

SAFE LOADS

IN TONS OF 2000 POUNDS UNIFORMLY DISTRIBUTED FOR

BOX GIRDERS

COMPOSED OF TWO STEEL BEAMS AND TWO 16" x 5/16" STEEL PLATES

Distance, Center to Center of Bearings, Feet	2-20" Steel Beams 65 Pounds per Foot — 7½" — 2-16"X5/16" Steel Plates				2-24" Steel Beams 80 Pounds per Foot — 8" — 2-16"X5/16" Steel Plates				Add to Weight of Girder for ¼" Increase in Thickness of Plates
	Safe Load Including Weight of Girder, Tons	Weight of Girder, Pounds	Add to Safe Load for 5 Pounds Increase of Weight of Beams	Add to Safe Load for ¼" Increase in Thickness of Plates	Safe Load Including Weight of Girder, Tons	Weight of Girder, Pounds	Add to Safe Load for 5 Pounds Increase in Weight of Beams	Add to Safe Load for ¼" Increase in Thickness of Plates	
12	183.0	2563	4.36	8.00	256.6	2923	5.23	9.58	82
13	168.8	2777	4.02	7.38	236.8	3167	4.83	8.84	88
14	156.8	2999	3.74	6.85	219.9	3410	4.48	8.21	95
15	146.4	3204	3.48	6.40	205.2	3654	4.18	7.66	102
16	137.2	3418	3.26	6.00	192.4	3898	3.92	7.18	109
17	129.2	3631	3.02	5.64	181.1	4141	3.70	6.76	116
18	122.0	3845	2.90	5.33	171.0	4385	3.49	6.39	122
19	115.5	4058	2.76	5.05	162.1	4628	3.30	6.05	129
20	109.8	4272	2.62	4.80	153.9	4872	3.14	5.75	136
21	104.5	4486	2.50	4.56	146.6	5116	2.99	5.47	143
22	99.8	4699	2.38	4.36	139.9	5359	2.85	5.22	150
23	95.4	4913	2.28	4.17	133.9	5603	2.73	5.00	156
24	91.5	5126	2.18	4.00	128.3	5846	2.61	4.79	163
25	87.8	5340	2.08	3.84	123.1	6090	2.51	4.60	170
26	84.4	5554	2.00	3.69	118.4	6334	2.41	4.42	177
27	81.3	5767	1.92	3.55	114.0	6577	2.32	4.25	184
28	78.4	5981	1.86	3.43	109.9	6821	2.24	4.10	190
29	75.7	6194	1.80	3.31	106.1	7064	2.16	3.96	197
30	73.2	6408	1.74	3.20	102.6	7308	2.09	3.83	204
31	70.8	6622	1.68	3.09	99.3	7552	2.02	3.71	211
32	68.6	6835	1.62	3.00	96.2	7795	1.96	3.59	218
33	66.5	7049	1.58	2.91	93.3	8039	1.90	3.48	224
34	64.6	7262	1.52	2.82	90.5	8282	1.85	3.38	231
35	62.7	7476	1.46	2.74	88.0	8526	1.79	2.28	238
36	61.0	7690	1.40	2.66	85.5	8770	1.74	3.19	245
37	59.3	7903	1.38	2.59	83.2	9013	1.70	3.10	252
38	57.7	8117	1.36	2.52	81.0	9257	1.65	3.02	258

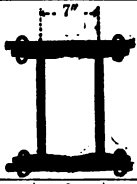
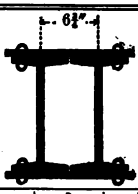
Above values are based on maximum fiber strain of 16,000 pounds per square inch, ⅞ inch rivet holes deducted. Weights correspond to length, center to center of bearings.

SAFE LOADS

IN TONS OF 2000 POUNDS UNIFORMLY DISTRIBUTED FOR

BOX GIRDERS

OMPOSED OF TWO 18" STEEL BEAMS AND TWO 16"x¾" STEEL PLATES

2-18" Steel Beams 70 Pounds per Foot  2-16"×¾" Steel Plates			2-18" Steel Beams 55 Pounds per Foot  2-16"×¾" Steel Plates				
Safe Load Including Weight of Girder, Tons	Weight of Girder, Pounds	Add to Safe Load for ¼" Increase in Thickness of Plates	Safe Load Including Weight of Girders, Tons	Weight of Girder, Pounds	Add to Safe Load for 5 Pounds Increase in Weight of Beam	Add to Safe Load for ¼" Increase in Thickness of Plates	Add to Weight of Girder for ¼" Increase in Thickness of Plates
162.6	2712	6.68	151.3	2352	3.92	6.68	82
150.1	2938	6.17	139.7	2548	3.62	6.17	88
139.4	3164	5.73	129.7	2744	3.36	5.73	95
130.1	3390	5.35	121.1	2940	3.14	5.35	102
121.9	3616	5.01	113.5	3136	2.94	5.01	109
114.8	3842	4.72	106.8	3332	2.77	4.72	116
108.4	4068	4.45	100.9	3528	2.61	4.45	122
102.7	4294	4.22	95.6	3724	2.47	4.22	129
97.5	4520	4.01	90.8	3920	2.35	4.01	136
92.9	4746	3.82	86.5	4116	2.24	3.82	143
88.7	4972	3.64	81.7	4312	2.14	3.64	150
84.8	5198	3.49	78.9	4508	2.04	3.49	156
81.3	5424	3.34	75.7	4704	1.96	3.34	163
78.0	5650	3.21	72.6	4900	1.88	3.21	170
75.0	5876	3.08	69.8	5096	1.81	3.08	177
72.2	6102	2.97	67.2	5292	1.74	2.97	184
69.7	6328	2.86	64.8	5488	1.68	2.86	190
67.3	6554	2.76	62.6	5684	1.62	2.76	197
65.0	6780	2.67	60.5	5880	1.57	2.67	204
62.9	7006	2.58	58.6	6076	1.52	2.58	211
61.0	7232	2.50	56.7	6272	1.47	2.50	218
59.1	7458	2.43	54.5	6468	1.42	2.43	224
57.4	7684	2.36	53.4	6664	1.38	2.36	231
55.7	7910	2.29	51.9	6860	1.34	2.29	238
54.2	8136	2.23	50.4	7056	1.30	2.23	245
52.7	8362	2.17	49.1	7252	1.26	2.17	252
51.3	8588	2.11	47.8	7448	1.23	2.11	258

ove values are based on maximum fiber strain of 16,000 pounds quare inch, $\frac{13}{16}$ inch rivet holes deducted. Weights correspond gth, center to center of bearings.

SAFE LOADS

IN TONS OF 2000 POUNDS UNIFORMLY DISTRIBUTED FOR

BOX GIRDERS

COMPOSED OF TWO 15" STEEL BEAMS AND TWO 14"×⅝" STEEL PLATES

Distance, Center to Center of Bearings, Feet	2-15" Steel Beams 42 Pounds per Foot 2-14"×⅝" Steel Plates			2-15" Steel Beams 60 Pounds per Foot 2-14"×⅝" Steel Plates			Add to Safe Load for ¼" Increase in Thickness of Plates	Add to Weight of Girder for ¼" Increase in Thickness of Flange Plates
	Safe Load Including Weight of Girder, Tons	Weight of Girder, Pounds	Add to Safe Load for 1 Pound Increase in Weight of Beam	Safe Load Including Weight of Girder, Tons	Weight of Girder, Pounds	Add to Safe Load for 5 Pounds Increase in Weight of Beam		
12	94.3	1746	0.60	111.0	2178	3.03	5.17	72
13	87.1	1891	0.55	102.4	2359	2.80	4.77	78
14	80.8	2037	0.51	95.1	2541	2.60	4.43	84
15	75.5	2182	0.48	88.8	2722	2.43	4.13	90
16	70.7	2328	0.45	83.2	2904	2.27	3.87	96
17	66.6	2473	0.42	78.3	3085	2.14	3.65	102
18	62.9	2619	0.40	74.0	3267	2.02	3.44	108
19	59.6	2764	0.38	70.1	3448	1.91	3.26	114
20	56.6	2910	0.36	66.6	3630	1.82	3.10	120
21	53.9	3055	0.34	63.4	3811	1.73	2.95	126
22	51.4	3201	0.33	60.5	3993	1.65	2.82	132
23	49.2	3346	0.31	57.9	4174	1.58	2.70	138
24	47.1	3492	0.30	55.5	4356	1.51	2.58	144
25	45.3	3637	0.29	52.2	4537	1.45	2.48	150
26	43.5	3783	0.28	51.2	4719	1.40	2.38	156
27	41.9	3928	0.27	49.3	4900	1.35	2.29	162
28	40.4	4074	0.26	47.5	5082	1.30	2.21	168
29	39.0	4219	0.25	46.1	5263	1.25	2.14	174
30	37.7	4365	0.24	44.4	5445	1.21	2.07	180
31	36.5	4510	0.23	42.9	5626	1.17	2.00	186
32	35.4	4656	0.22	41.6	5808	1.13	1.94	192
33	34.3	4801	0.22	40.3	5989	1.10	1.88	198
34	33.3	4947	0.21	39.1	6171	1.07	1.82	204
35	32.2	5092	0.29	38.0	6352	1.04	1.77	210
36	31.4	5238	0.20	37.0	6534	1.01	1.72	216
37	30.6	5383	0.19	36.0	6715	0.98	1.67	222
38	29.8	5529	0.19	35.0	6897	0.95	1.63	228

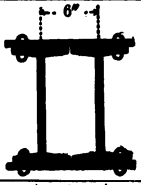
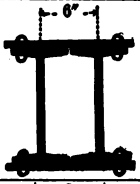
Above values are based on maximum fiber strain of 16,000 pounds per square inch, $\frac{13}{16}$ inch rivet holes deducted. Weights correspond to length, center to center of bearings.

SAFE LOADS

IN TONS OF 2000 POUNDS UNIFORMLY DISTRIBUTED FOR

BOX GIRDERS

COMPOSED OF TWO 12″ STEEL BEAMS AND TWO 14″×½″ STEEL PLATES

2-12″ Steel Beams 31½ Pounds per Foot  2-14″×½″ Steel Plates			2-12″ Steel Beams 40 Pounds per Foot  2-14″×½″ Steel Plates			Add to Safe Load for ¼″ Increase in Thickness of Plates	Add to Weight of Girder for ¼″ Increase in Thickness of Flange Plates
Safe Load Including Weight of Girder, Tons	Weight of Girder, Pounds	Add to Safe Load for 3½ Pounds Increase in Weight of Beam	Safe Load Including Weight of Girder, Tons	Weight of Girder, Pounds	Add to Safe Load for 5 Pounds Increase in Weight of Beam		
58.7	1351	1.82	65.2	1555	2.62	4.47	71
54.2	1464	1.68	60.2	1685	2.42	4.12	77
50.3	1576	1.57	55.9	1814	2.24	3.83	83
46.9	1689	1.46	52.1	1944	2.08	3.57	89
44.0	1802	1.38	48.9	2074	1.96	3.35	95
41.4	1914	1.30	46.0	2203	1.86	3.15	101
39.1	2027	1.22	43.5	2333	1.74	2.98	107
37.1	2139	1.14	41.2	2462	1.66	2.82	113
35.2	2252	1.10	39.1	2592	1.58	2.68	119
33.5	2365	1.04	37.2	2722	1.50	2.56	125
32.0	2477	1.00	35.5	2851	1.42	2.44	131
30.6	2590	0.96	34.0	2981	1.38	2.33	137
29.3	2702	0.92	32.6	3110	1.30	2.24	143
28.2	2815	0.87	31.3	3240	1.26	2.15	149
27.1	2928	0.82	30.1	3370	1.22	2.06	155
26.1	3040	0.78	29.0	3499	1.16	1.98	161
25.1	3153	0.76	27.9	3629	1.12	1.91	167
24.3	3265	0.74	27.0	3758	1.08	1.84	173
23.5	3378	0.72	26.1	3888	1.02	1.78	179
22.7	3491	0.70	25.2	4018	1.00	1.73	184
22.0	3603	0.68	24.4	4147	0.98	1.68	190
21.3	3716	0.66	23.7	4277	0.96	1.63	196
20.7	3828	0.64	23.0	4406	0.92	1.58	202
20.1	3941	0.62	22.3	4536	0.90	1.53	208
19.5	4054	0.60	21.7	4666	0.88	1.49	214
19.0	4166	0.58	21.1	4795	0.86	1.45	220
18.5	4279	0.57	20.6	4925	0.84	1.41	226

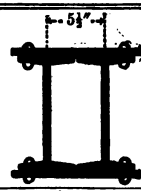
bove values are based on maximum fiber strain of 16,000 pounds square inch, $\frac{11}{16}$ inch rivet holes deducted. Weights correspond ength, center to center of bearings.

SAFE LOADS

IN TONS OF 2000 POUNDS UNIFORMLY DISTRIBUTED FOR

BOX GIRDERS

COMPOSED OF TWO 10" STEEL BEAMS AND TWO 12"x ½" STEEL PLATES



2-10" Steel Beams
25 Pounds per Foot

2-12"×½"
Steel Plates

Distance Center to Center of Bearings, Feet	Safe Load Including Weight of Girder, Tons	Weight of Girder, Pounds	Add to Safe Load for 5 Pounds Increase in Weight of Beam	Add to Safe Load for ¼" Increase in Thickness of Plate	Add to Weight of Girder for 5 Pounds Increase in Weight of Beam	Add to Weight of Girder for ¼" Increase in Thickness of Plates
12	40.0	1114	1.92	2.89	120	61
13	36.9	1206	1.77	2.67	130	66
14	34.3	1299	1.64	2.48	140	71
15	32.0	1392	1.54	1.31	150	77
16	30.0	1485	1.44	1.16	160	82
17	28.2	1578	1.35	1.04	170	87
18	26.7	1670	1.28	1.93	180	92
19	25.3	1763	1.20	1.82	190	97
20	24.0	1856	1.14	1.73	200	102
21	22.8	1949	1.09	1.64	210	107
22	21.7	2042	1.04	1.57	220	112
23	20.9	2134	1.00	1,51	230	117
24	20.0	2227	0.96	1.44	240	122
25	19.2	2320	0.92	1.39	250	128
26	18.5	2413	0.89	1.33	260	133
27	17.8	2506	0.84	1.28	270	138
28	17.1	2598	0.82	1.24	280	143
29	16.5	2691	0.79	1.19	290	148
30	16.0	2784	0.76	1.16	300	153
31	15.5	2877	0.74	1.12	310	158
32	15.0	2970	0.71	1.08	320	163
33	14.5	3062	0.70	1.04	330	168
34	14.1	3155	0.68	1.02	340	173
35	13.7	3248	0.65	1.00	350	179
36	13.3	3341	0.64	0.96	360	184
37	13.0	3434	0.62	0.93	370	189
38	12.6	3526	0.60	0.86	380	194

Above values are based on maximum fiber strain of 16,000 pounds per square inch, $\frac{13}{16}$ inch rivet holes deducted. Weights correspond to length, center to center of bearings.

EXPLANATION OF TABLE OF SAFE LOADS FOR COLUMNS

The tables of safe loads for steel columns are based on the formula led for by the Building Ordinances of the City of Chicago and en in "General Specifications for Structural Work of Buildings" C. C. Schneider, Member American Society Civil Engineers. is formula is also required by the American Railway and Maintance of Way Association specifications.

t is assumed that columns are symmetrically loaded; where entrically loaded the values given will be considerably reduced l should be specially calculated.

Plate and angle columns are generally the most economical of built-up columns on account of their requiring a comparatively all amount of fabrication and because of the great variety of tions from which they can be constructed.

Tables of safe loads of other column sections in general use are en on the following pages which will be found adapted to partic- r cases of construction.

The tables of safe loads for single and double angles used as columns struts will be found extremely useful in the designing of nearly all ds of steel structures.

The weights of columns given in the tables are per lineal foot of ft and do not include any allowances for bases, brackets or other nections as these depend upon the particular details and require- nts of each case.

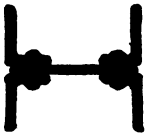


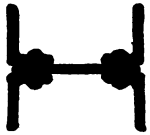
PLATE AND ANGLE COLUMNS

SAFE LOADS IN THOUSANDS OF POUNDS

Allowable unit stress = $16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = least radius of gyration in inches $\qquad \frac{l}{r} < 125$



Plate, Inches	Angles	Area	r	Weight per Lineal Foot	Unsupported Length of Column in Feet									
					10	11	12	13	14	15	16	17	18	20
6×¼	2½×2 ×¼	5.7	1.04	20.0	45.2	40.6	.....	.....	.....	.....	.....	.....	.....	.....
	3 ×2 ×¼	6.3	1.28	21.5	59.4	55.3	51.2	47.1	.....	.....	.....	.....	.....	.....
	3 ×2½×¼	6.7	1.24	23.1	62.0	57.5	53.0	48.5	.....	.....	.....	.....	.....	.....
	3 ×2½×⅜	8.0	1.27	27.5	74.9	69.6	64.3	59.0	.....	.....	.....	.....	.....	.....
	3½×2½×¼	7.3	1.48	24.7	75.3	71.2	67.1	63.0	58.9	54.8	.....	.....	.....	.....
	3½×2½×⅜	8.6	1.53	29.5	90.5	85.8	81.1	76.4	71.7	67.0	62.3	.....	.....	.....
7×¼	2½×2 ×¼	6.0	1.01	20.75	46.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
	3 ×2 ×¼	6.5	1.26	22.35	60.8	56.5	52.2	47.9	.....	.....	.....	.....	.....	.....
	3 ×2½×¼	7.0	1.21	23.95	63.2	58.3	53.4	48.5	.....	.....	.....	.....	.....	.....
	3 ×2½×⅜	8.2	1.26	28.35	76.4	70.9	65.4	59.9	.....	.....	.....	.....	.....	.....
	3½×2½×¼	7.5	1.46	25.55	76.9	72.6	68.3	64.0	59.7	55.4	.....	.....	.....	.....
	3½×2½×⅜	8.9	1.50	30.35	92.6	87.6	82.6	77.7	72.7	67.7	62.7	.....	.....	.....
8×¼	2½×2 ×¼	6.2	0.99	21.6	46.5	41.2	35.9	.....	.....	.....	.....	.....	.....	.....
	3 ×2 ×¼	6.8	1.23	23.2	62.4	57.8	53.2	48.6	.....	.....	.....	.....	.....	.....
	3 ×2½×¼	7.2	1.20	24.8	64.8	59.8	54.8	49.8	.....	.....	.....	.....	.....	.....
	3 ×2½×⅜	8.5	1.23	29.2	78.0	72.2	66.4	60.8	.....	.....	.....	.....	.....	.....
	3½×2½×¼	7.8	1.43	26.4	78.8	74.2	69.6	65.0	60.4	55.8	.....	.....	.....	.....
	3½×2½×⅜	9.1	1.49	31.2	94.7	89.6	84.5	79.4	74.3	69.2	64.1	.....	.....	.....
	4 ×3 ×⅜	10.4	1.69	35.6	114.6	109.4	104.2	99.0	93.8	88.6	83.4	78.2	73.0	.....
	4 ×3 ×⅝	11.9	1.72	40.8	132.4	126.6	120.8	115.0	109.2	103.4	97.6	91.8	86.0	.....
8×⅜	3 ×2½×⅜	9.0	1.22	30.9	82.1	75.9	69.7	63.5	.....	.....	.....	.....	.....	.....

CAPACITIES IN THOUSANDS OF POUNDS

Allowable unit stress = $16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = least radius of gyration in inches $\frac{l}{r} < 125$

Plate, Inches	Angles	Area	r	Weight per Lineal Foot	Unsupported Length of Column in Feet									
					10	11	12	13	14	15	16	17	18	20
8×7/16	3½×2½×7/16	9.6	1.47	32.9	99.0	93.5	88.0	82.5	77.0	71.5	.....	.....	.....	.....
	4 ×3 ×7/16	10.9	1.67	37.3	119.5	114.0	108.5	103.0	97.5	92.0	86.5	81.0	.....	.....
	4 ×3 ×5/8	12.4	1.71	42.5	137.3	131.2	125.1	119.0	112.9	106.8	100.7	94.6	88.5	.....
	4 ×3 ×7/16	14.0	1.74	47.7	156.4	149.6	142.8	136.0	129.2	122.4	115.6	108.8	102.0	.....
8×3/8	4 ×3 ×5/8	12.9	1.70	44.2	142.4	136.0	129.6	123.2	116.8	110.4	104.0	97.6	91.2	.....
	4 ×3 ×7/16	14.5	1.74	49.4	162.0	155.0	148.0	141.0	134.0	127.0	120.0	113.0	106.0	.....
	4 ×3 ×½	16.0	1.77	54.6	179.8	172.2	164.6	157.0	149.4	141.8	134.2	126.6	119.0	.....
8×½	4 ×3 ×½	17.0	1.76	58.0	190.8	182.7	174.6	166.5	158.4	150.3	142.2	134.1	126.0	.....
	4 ×3 ×7/16	18.5	1.79	63.2	209.1	200.4	191.7	183.0	174.3	165.6	156.9	148.2	139.5	.....
	4 ×3 ×5/8	19.9	1.82	68.0	226.9	217.7	208.5	199.3	190.1	180.9	171.7	162.5	153.3	.....
9×¼	3 ×2½×¼	7.5	1.17	25.65	66.1	60.7	55.3	.....	.....	.....	.....	.....	.....	.....
	3 ×2½×7/16	8.7	1.22	30.05	79.4	73.4	67.4	61.4	.....	.....	.....	.....	.....	.....
	3½×2½×¼	8.0	1.41	27.25	80.4	75.6	70.8	66.0	61.2	.....	.....	.....	.....	.....
	3½×2½×7/16	9.4	1.46	32.05	96.4	91.0	85.6	80.2	74.8	69.4	.....	.....	.....	.....
	3½×2½×5/8	10.69	1.50	36.4	111.2	105.2	99.2	93.2	87.2	81.2	75.2	.....	.....	.....
	3½×2½×½	13.25	1.56	43.25	140.8	133.7	126.6	119.5	112.4	105.3	98.2	.....	.....	.....
	3½×3 ×7/16	9.97	1.42	34.05	100.4	94.5	88.6	82.7	76.8	.....	.....	.....	.....	.....
	3½×3 ×5/8	11.45	1.46	39.25	117.4	110.8	104.2	97.6	91.0	.....	.....	.....	.....	.....
	3½×3 ×½	14.25	1.52	48.45	149.2	141.3	133.4	125.5	117.6	109.7	101.8	.....	.....	.....
	4 ×3 ×7/16	10.61	1.67	36.45	116.5	111.2	105.9	100.6	95.3	90.0	84.7	.....	.....	.....
	4 ×3 ×5/8	12.17	1.71	41.65	134.8	128.8	122.8	116.8	110.8	104.8	98.8	92.8	86.8	.....

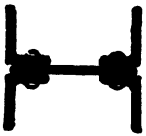
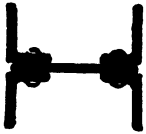


PLATE AND ANGLE COLUMNS
SAFE LOADS IN THOUSANDS OF POUNDS

Allowable unit stress $= 16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = least radius of gyration in inches $\qquad \frac{l}{r} < 125$



Plate, Inches	Angles	Area	r	Weight per Lineal Foot	Unsupported Length of Column in Feet									
					10	12	14	16	18	20	22	24	26	28
9×¼	4 ×3 ×½	15.25	1.77	52.05	171.6	157.2	142.8	128.4	114.0	.....	.....	.....	.....	.....
	5 ×3 ×½	11.85	2.18	40.45	143.8	134.6	125.4	116.2	107.0	97.8	88.6	.....	.....	.....
	5 ×3 ×⅜	13.69	2.22	46.85	166.9	156.5	146.1	135.7	125.3	114.9	104.5	.....	.....	.....
	5 ×3 ×½	17.25	2.29	58.85	212.9	200.3	187.7	175.1	162.5	149.9	137.3	125.7	.....	.....
	5 ×3½×⅜	14.45	2.17	49.26	175.0	163.8	152.6	141.4	130.2	119.0	107.8	.....	.....	.....
	5 ×3½×½	18.25	2.23	63.05	223.2	209.4	195.6	181.8	168.0	154.2	140.4	.....	.....	.....
	6 ×3½×⅜	15.93	2.69	54.45	205.5	195.5	185.5	175.5	165.5	155.5	145.5	135.5	125.5	.....
	6 ×3½×½	20.25	2.76	68.85	262.1	249.7	237.3	224.9	212.5	200.1	187.7	175.3	162.9	150.5
	6 ×4 ×⅜	16.69	2.63	56.85	213.4	202.8	192.2	181.6	171.0	160.4	149.8	139.2	128.6	.....
	6 ×4 ×½	21.25	2.70	72.45	274.5	261.3	248.1	234.9	221.7	208.5	195.3	182.1	168.9	155.7
9×⅜	3 ×2½×⅜	11.06	1.23	37.88	101.3	86.1	.....	.....	.....	.....	.....	.....	.....	.....
	3½×2½×⅜	11.82	1.47	40.28	121.7	108.1	94.5	.....	.....	.....	.....	.....	.....	.....
	3½×2½×½	14.38	1.54	49.09	151.6	136.0	120.4	104.8	.....	.....	.....	.....	.....	.....
	3½×3 ×⅜	12.58	1.43	43.08	127.2	112.4	97.6	.....	.....	.....	.....	.....	.....	.....
	3½×3 ×½	15.38	1.50	52.28	159.8	142.6	125.4	108.2	.....	.....	.....	.....	.....	.....
	3½×3 ×⅝	18.06	1.55	61.48	190.9	171.5	152.1	132.7	.....	.....	.....	.....	.....	.....
	4 ×3 ×⅜	13.30	1.68	45.48	146.4	133.2	120.0	106.8	93.6	.....	.....	.....	.....	.....
	4 ×3 ×½	16.38	1.75	55.88	183.2	167.4	151.6	135.8	120.0	.....	.....	.....	.....	.....
	4 ×3 ×⅝	19.3	1.81	65.88	219.0	201.2	183.4	165.6	147.8	.....	.....	.....	.....	.....
	5 ×3 ×⅜	14.82	2.18	50.68	180.2	168.8	157.4	146.0	134.6	123.2	.....	.....	.....	.....
	5 ×3 ×½	18.38	2.27	62.68	226.0	212.4	198.8	185.2	171.6	158.0	144.4	.....	.....	.....
	5 ×3 ×⅝	21.82	2.33	74.28	270.6	254.8	239.0	223.2	207.4	191.6	175.8	160.0	.....	.....
	5 ×3½×⅜	15.58	2.13	53.08	188.0	175.6	163.2	150.8	138.4	126.0	113.6	.....	.....	.....
	5 ×3½×½	19.38	2.21	65.88	236.1	221.5	206.9	192.3	177.7	163.1	148.5	.....	.....	.....
	5 ×3½×⅝	23.06	2.27	78.68	284.3	267.1	249.9	232.7	215.5	198.3	181.1	163.9	.....	.....

PLATE AND ANGLE COLUMNS

SAFE LOADS IN THOUSANDS OF POUNDS

Allowable unit stress = $16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = least radius of gyration in inches $\qquad \frac{l}{r} < 125$

Plate, Inches	Angles	Area	r	Weight per Lineal Foot	Unsupported Length of Column in Feet									
					10	12	14	16	18	20	22	24	26	28
9×⅜	5 ×3½×¾	26.62	2.32	85.48	329.1	309.9	290.7	271.5	252.3	233.1	213.9	194.7	.....	.....
	6 ×3½×⅝	17.06	2.64	58.28	218.7	207.9	197.1	186.3	175.5	164.7	153.9	143.1	132.3	121.5
	6 ×3½×½	21.38	2.73	72.68	276.4	263.2	250.0	236.8	223.6	210.4	197.2	184.0	170.8	157.0
	6 ×3½×⅜	25.58	2.79	87.06	332.4	317.0	301.6	286.2	270.8	255.4	240.0	224.6	209.2	193.8
	6 ×3½×¾	29.62	2.85	101.08	386.6	369.2	351.8	334.4	317.0	299.6	282.2	264.8	247.4	230.0
	6 ×4 ×⅝	17.78	2.59	60.7	226.8	215.2	203.6	192.0	180.4	168.8	157.2	145.6	134.0	.....
	6 ×4 ×½	22.38	2.67	76.3	287.7	273.5	259.3	245.1	230.9	216.7	202.5	188.3	174.1	159.9
	6 ×4 ×⅝	26.82	2.73	91.5	346.0	329.6	313.2	296.8	280.4	264.0	247.6	231.2	214.8	198.4
	6 ×4 ×¾	31.14	2.78	105.9	404.0	385.2	366.4	347.6	328.8	310.0	291.2	272.4	253.6	234.8
9×½	3½×2½×½	15.5	1.53	52.9	163.0	146.0	129.0	112.0	.....	.....	.....	.....	.....	.....
	3½×3 ×½	16.5	1.49	56.1	171.0	152.4	133.8	115.2	.....	.....	.....	.....	.....	.....
	3½×3 ×⅝	19.18	1.55	65.3	202.8	182.1	161.4	140.7	.....	.....	.....	.....	.....	.....
	4 ×3 ×½	17.50	1.74	59.7	195.3	178.4	161.5	144.6	127.7	.....	.....	.....	.....	.....
	4 ×3 ×⅝	20.42	1.78	69.7	230.5	211.2	191.9	172.6	153.3	.....	.....	.....	.....	.....
	5 ×3 ×½	19.50	2.24	66.5	238.8	224.2	209.6	195.0	180.4	165.8	151.2	.....	.....	.....
	5 ×3 ×⅝	22.94	2.32	78.1	284.0	267.4	250.8	234.2	217.6	201.0	184.4	167.8	.....	.....
	5 ×3½×½	20.50	2.19	69.7	249.5	233.8	218.1	202.4	186.7	171.0	155.3	.....	.....	.....
	5 ×3½×⅝	24.18	2.26	82.5	296.6	278.7	260.8	242.9	225.0	207.1	189.2	171.3	.....	.....
	5 ×3½×¾	27.74	2.32	94.5	343.5	323.4	303.3	283.2	263.1	243.0	222.9	202.8	.....	.....
	6 ×3½×½	22.50	2.70	76.5	290.0	276.0	262.0	248.0	234.0	220.0	206.0	192.0	178.0	164.0
	6 ×3½×⅝	26.70	2.78	90.9	346.4	330.3	314.2	298.1	282.0	265.9	249.8	233.7	217.6	201.5
	6 ×3½×¾	30.74	2.84	104.9	400.6	382.5	364.4	346.3	328.2	310.1	292.0	273.9	255.8	237.7
	6 ×4 ×½	23.50	2.65	80.1	301.8	286.9	272.0	257.1	242.2	227.3	212.4	197.5	182.6	167.5
	6 ×4 ×⅝	27.94	2.72	95.3	360.6	343.4	326.2	309.0	291.8	274.6	257.4	240.2	223.0	205.8
	6 ×4 ×¾	32.26	2.78	109.7	419.0	399.5	380.0	360.5	341.0	321.5	302.0	282.5	263.0	243.5

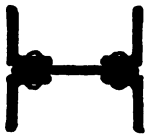
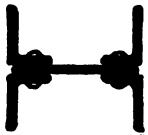


PLATE AND ANGLE COLUMNS
SAFE LOADS IN THOUSANDS OF POUNDS

Allowable unit stress $= 16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = least radius of gyration in inches $\qquad \frac{l}{r} < 125$



Plate, Inches	Angles	Area	r	Weight per Lineal Foot	Unsupported Length of Column in Feet									
					10	12	14	16	18	20	22	24	26	28
10×¾	3½×2½×¼	8.26	1.39	28.1	82.3	72.3	62.3	.....	.....	.....	.....	.....	.....	.....
	3½×2½×⅜	10.94	1.49	37.3	113.4	101.0	88.6	.....	.....	.....	.....	.....	.....	.....
	3½×3½×½	13.50	1.55	46.1	143.0	128.3	113.6	98.9	.....	.....	.....	.....	.....	.....
	3½×3 ×⅜	10.22	1.40	34.9	102.2	89.9	77.6	.....	.....	.....	.....	.....	.....	.....
	3½×3 ×½	11.70	1.44	40.1	119.0	105.3	91.6	.....	.....	.....	.....	.....	.....	.....
	3½×3 ×½	14.50	1.50	49.3	150.8	134.6	118.4	.....	.....	.....	.....	.....	.....	.....
	4 ×3 ×⅜	10.86	1.65	37.3	118.5	107.5	96.5	85.5	.....	.....	.....	.....	.....	.....
	4 ×3 ×½	12.42	1.69	42.5	137.1	124.7	112.3	99.9	.....	.....	.....	.....	.....	.....
	4 ×3 ×½	15.50	1.76	52.9	174.0	159.2	144.4	129.6	114.8	.....	.....	.....	.....	.....
	5 ×3 ×⅜	12.10	2.16	41.3	146.5	137.1	127.7	118.3	108.9	99.5	90.1	.....	.....	.....
	5 ×3 ×½	13.94	2.20	47.7	169.9	159.8	148.7	138.1	127.5	116.9	106.3	.....	.....	.....
	5 ×3 ×½	17.50	2.28	59.7	215.7	202.8	189.9	177.0	164.1	151.2	138.3	125.4	.....	.....
	5 ×3½×⅜	14.70	2.15	50.1	177.8	166.3	154.8	143.3	131.8	120.3	108.8	.....	.....	.....
	5 ×3½×½	18.50	2.22	62.9	226.0	212.0	198.0	184.0	170.0	156.0	142.0	.....	.....	.....
	6 ×3½×⅜	16.18	2.67	55.3	207.8	197.7	187.6	177.5	167.4	157.3	147.2	137.1	127.0	116.9
	6 ×3½×½	20.50	2.74	69.7	265.0	252.4	239.8	227.2	214.6	202.0	189.4	176.8	164.2	151.6
	6 ×4 ×½	16.94	2.61	58.5	216.4	205.5	194.6	183.7	172.8	161.9	151.0	140.1	129.2	.....
10×⅜	3½×2½×⅜	12.19	1.45	41.55	124.5	110.4	96.3	.....	.....	.....	.....	.....	.....	.....
	3½×2½×½	14.75	1.52	50.35	154.4	138.2	122.0	105.8	.....	.....	.....	.....	.....	.....
	3½×3 ×⅜	12.95	1.41	44.15	130.1	114.6	99.1	.....	.....	.....	.....	.....	.....	.....
	3½×3 ×½	15.75	1.48	53.55	162.6	144.8	127.0	.....	.....	.....	.....	.....	.....	.....
	3½×3 ×⅝	18.43	1.54	62.75	194.5	174.4	154.3	134.2	.....	.....	.....	.....	.....	.....
	4 ×3 ×⅝	18.67	1.65	46.75	149.0	135.1	121.2	107.3	.....	.....	.....	.....	.....	.....
	4 ×3 ×½	16.75	1.73	57.15	186.9	170.6	154.3	138.0	121.7	.....	.....	.....	.....	.....
	4 ×3 ×⅝	19.67	1.79	67.15	222.3	203.9	185.5	167.1	148.7	.....	.....	.....	.....	.....
	5 ×3 ×⅝	15.19	2.15	51.95	183.5	171.6	159.7	147.8	135.9	124.0	112.2	.....	.....	.....

CHICAGO—JOSEPH T. RYERSON & SON—NEW YORK

Allowable unit stress = $16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = least radius of gyration in inches

$\frac{l}{r} < 125$

Plate, Inches	Angles	Area	r	Weight per Lineal Foot	Unsupported Length of Column in Feet									
					10	12	14	16	18	20	22	24	26	28
10×⅜	5 ×3 ×½	18.75	2.24	63.95	229.8	215.7	201.6	187.5	173.4	159.3	145.2	.....	.....	.....
	5 ×3 ×⅝	22.19	2.31	75.55	274.0	258.0	242.0	226.0	210.0	194.0	178.0	162.0	.....	.....
	5 ×3½×⅜	15.95	2.10	54.35	191.4	178.7	166.0	153.3	140.6	127.9	115.2	.....	.....	.....
	5 ×3½×½	19.75	2.19	67.15	240.0	224.9	209.8	194.7	179.6	164.5	149.4	.....	.....	.....
	5 ×3½×⅝	23.43	2.25	79.95	287.7	270.2	252.7	235.2	217.7	200.2	182.7	.....	.....	.....
	6 ×3½×⅜	17.43	2.62	59.55	223.4	212.2	201.0	189.8	178.6	167.4	156.2	145.0	133.8	.....
	6 ×3½×½	21.75	2.70	73.95	280.0	266.5	253.0	249.5	236.0	212.5	199.0	185.5	172.0	158.5
	6 ×3½×⅝	25.95	2.77	88.35	336.0	320.3	304.6	288.9	273.2	257.5	241.8	226.1	210.4	194.7
	6 ×3½×¾	29.99	2.83	102.35	391.0	373.2	355.4	337.6	319.8	302.0	284.2	266.4	248.6	230.8
	6 ×4 ×⅜	18.19	2.56	61.95	231.3	219.4	207.5	195.6	183.7	171.8	159.9	148.0	136.1	.....
	6 ×4 ×½	22.75	2.65	77.55	291.8	277.4	263.0	248.6	234.2	219.8	205.4	191.0	176.6	.....
	6 ×4 ×⅝	27.19	2.71	92.75	350.2	333.4	316.6	299.8	283.0	266.2	249.4	232.6	215.8	199.0
	6 ×4 ×¾	31.51	2.76	107.15	408.0	388.9	369.8	350.7	331.6	312.5	293.4	274.3	255.2	236.1
10×½	3½×2½×½	16.00	1.50	54.6	166.1	148.3	130.5	.....	.....	.....	.....	.....	.....	.....
	3½×3 ×½	17.00	1.47	57.8	175.0	155.5	136.0	.....	.....	.....	.....	.....	.....	.....
	3½×3 ×⅝	19.68	1.53	67.0	206.6	185.2	163.8	142.4	.....	.....	.....	.....	.....	.....
	4 ×3 ×½	18.00	1.71	61.4	199.5	182.0	164.5	147.0	.....	.....	.....	.....	.....	.....
	4 ×3 ×⅝	20.92	1.78	71.4	235.8	216.1	196.4	176.7	157.0	.....	.....	.....	.....	.....
	5 ×3 ×½	20.00	2.21	68.2	244.0	228.8	213.6	198.4	183.2	168.0	152.8	.....	.....	.....
	5 ×3 ×⅝	23.44	2.29	79.8	289.4	272.2	255.0	237.8	220.6	203.4	186.2	169.0	.....	.....
	5 ×3½×½	21.00	2.16	71.4	254.4	238.1	221.8	205.5	189.2	172.9	156.6	.....	.....	.....
	5 ×3½×⅝	24.68	2.23	84.2	302.0	283.4	264.8	246.2	227.6	209.0	190.4	.....	.....	.....
	6 ×3½×½	23.00	2.67	78.2	295.7	281.2	266.4	252.3	237.9	223.4	209.0	194.5	180.1	165.6
	6 ×3½×⅝	27.20	2.75	92.6	352.0	335.4	318.8	302.2	285.6	269.0	252.4	235.8	219.2	202.6
	6 ×3½×¼	31.24	2.82	106.6	406.5	387.9	369.3	350.7	332.1	313.5	294.9	276.3	257.7	239.1
	6 ×4 ×½	24.00	2.62	81.8	307.2	291.8	276.4	261.0	245.6	230.2	214.8	199.4	184.0	.....

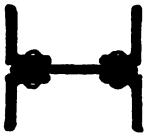
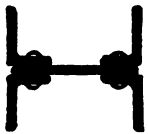


PLATE AND ANGLE COLUMNS
SAFE LOADS IN THOUSANDS OF POUNDS

Allowable unit stress = $16{,}000 - 70\,\frac{l}{r}$

l = unsupported length of column in inches

r = least radius of gyration in inches $\qquad \frac{l}{r} < 125$



Plate, Inches	Angles	Area	r	Weight per Lineal Foot	Unsupported Length of Column in Feet									
					10	12	14	16	18	20	22	24	26	28
10×½	6 × 4 × 5/8	28.44	2.69	97.0	366.2	384.4	380.6	312.8	295.0	277.2	259.4	241.6	223.8	206.0
	6 × 4 × 3/4	32.76	2.76	111.4	424.5	404.6	384.7	364.8	344.9	325.0	305.1	285.2	265.3	245.4
12×¼	3½×2½×¼	8.76	1.35	29.8	85.7	74.8	63.9	.....	.....	.....	.....	.....	.....	.....
	3½×2½×3/8	11.44	1.45	39.0	116.9	103.6	90.3	.....	.....	.....	.....	.....	.....	.....
	3½×2½×½	14.00	1.52	47.8	146.8	131.3	115.8	100.3	.....	.....	.....	.....	.....	.....
	3½×3 × 7/16	10.72	1.37	36.6	106.0	92.8	79.6	.....	.....	.....	.....	.....	.....	.....
	3½×3 × 5/8	12.20	1.41	41.8	122.4	107.9	93.4	.....	.....	.....	.....	.....	.....	.....
	3½×3 × ½	15.00	1.48	51.0	155.0	138.0	121.0	.....	.....	.....	.....	.....	.....	.....
	4 × 3 × 7/16	11.36	1.61	39.0	122.5	110.6	98.7	86.8	.....	.....	.....	.....	.....	.....
	4 × 3 × 5/8	12.92	1.66	44.2	141.5	128.4	115.3	102.2	.....	.....	.....	.....	.....	.....
	4 × 3 × ½	16.00	1.73	54.6	178.4	162.9	147.4	131.9	116.4	.....	.....	.....	.....	.....
	5 × 3 × 7/16	12.60	2.11	43.0	151.4	141.4	131.4	121.4	111.4	101.4	91.4	.....	.....	.....
	5 × 3 × 5/8	14.44	2.16	49.4	175.0	163.8	152.6	141.4	130.2	119.0	107.8	.....	.....	.....
	5 × 3 × ½	18.00	2.24	61.4	220.3	206.9	193.5	180.1	166.7	153.3	139.9	.....	.....	.....
	5 × 3½×5/8	15.20	2.11	51.8	182.9	170.8	158.7	146.6	134.5	122.4	110.3	.....	.....	.....
	5 × 3½×½	19.00	2.19	64.6	231.0	216.5	202.0	187.5	173.0	158.5	144.0	.....	.....	.....
	6 × 3½×5/8	16.68	2.63	57.0	213.7	203.1	192.5	181.9	171.3	160.7	150.1	139.5	128.9	.....
	6 × 3½×½	21.00	2.71	71.4	270.9	257.9	244.9	231.9	218.9	205.9	192.9	179.9	166.9	153.9
	6 × 4 × 5/8	17.44	2.57	59.4	222.2	210.8	199.4	188.0	176.6	165.2	153.8	142.4	131.0	.....
	6 × 4 × ½	22.00	2.65	75.0	282.2	268.3	254.4	240.5	226.6	212.7	198.8	184.9	171.0	.....
12×⅜	3½×2½×3/8	12.94	1.41	44.1	130.0	114.5	99.0	.....	.....	.....	.....	.....	.....	.....
	3½×2½×½	15.50	1.49	52.9	160.7	143.2	125.7	.....	.....	.....	.....	.....	.....	.....
	3½×3 × 5/8	13.70	1.37	46.9	135.1	118.4	101.7	.....	.....	.....	.....	.....	.....	.....
	3½×3 × ½	16.50	1.45	56.1	168.2	149.3	130.4	.....	.....	.....	.....	.....	.....	.....
	3½×3 × 5/8	19.18	1.51	65.3	200.2	178.8	157.4	.....	.....	.....	.....	.....	.....	.....

Allowable unit stress = $16{,}000 - 70\,\frac{l}{r}$

l = unsupported length of column in inches

r = least radius of gyration in inches $\qquad \frac{l}{r} < 125$

Plate, Inches	Angles	Area	r	Weight per Lineal Foot	Unsupported Length of Column in Feet									
					10	12	14	16	18	20	22	24	26	28
12×⅝	4 ×3 ×⅝	14.42	1.61	49.3	155.3	140.3	125.3	110.3	.....	.....	.....	.....	.....	.....
	4 ×3 ×½	17.50	1.69	59.7	193.0	175.7	158.4	141.1	.....	.....	.....	.....	.....	.....
	4 ×3 ×⅝	20.42	1.76	69.7	229.7	210.1	190.5	170.9	151.3	.....	.....	.....	.....	.....
	5 ×3 ×⅝	15.94	2.10	54.5	191.3	178.5	165.7	152.9	140.1	127.3	114.5	.....	.....	.....
	5 ×3 ×½	19.50	2.20	66.5	237.5	222.6	207.7	192.8	177.9	163.0	148.1	.....	.....	.....
	5 ×3 ×⅝	22.94	2.27	78.1	282.0	265.0	248.0	231.0	214.0	197.0	180.0	.....	.....	.....
	5 ×3½×⅝	16.70	2.06	56.9	199.0	185.4	171.8	158.2	144.6	131.0	.....	.....	.....	.....
	5 ×3½×½	20.50	2.15	69.7	248.0	232.0	216.0	200.0	184.0	168.0	152.0	.....	.....	.....
	5 ×3½×⅝	24.18	2.21	82.5	295.0	276.7	258.4	240.1	221.8	203.5	185.2	.....	.....	.....
	6 ×3½×⅝	18.18	2.56	62.1	231.3	219.4	207.5	195.6	183.7	171.8	159.9	148.0	136.1	.....
	6 ×3½×½	22.50	2.66	76.5	288.6	274.4	260.2	246.0	231.8	217.6	203.4	189.2	175.0	.....
	6 ×3½×⅝	26.70	2.73	90.9	345.0	328.6	312.2	295.8	279.4	263.0	246.6	230.2	213.8	197.4
	6 ×3½×¾	30.74	2.80	104.9	399.3	380.9	362.5	344.1	325.7	307.3	288.9	270.5	252.1	233.7
	6 ×4 ×⅝	18.94	2.51	64.5	239.8	227.1	214.4	201.7	189.0	176.3	163.6	150.9	138.2	.....
	6 ×4 ×½	23.50	2.61	80.1	300.0	285.0	270.0	255.0	240.0	225.0	210.0	195.0	180.0	.....
	6 ×4 ×⅝	27.94	2.67	95.3	359.0	341.5	324.0	306.5	289.0	271.5	254.0	236.5	219.0	.....
	6 ×4 ×¾	32.26	2.73	109.7	416.8	397.0	377.2	357.4	337.6	317.8	298.0	278.2	258.4	238.6
12×½	3½×2½×½	17.00	1.46	58.0	174.2	154.7	135.2	.....	.....	.....	.....	.....	.....	.....
	3½×3 ×½	18.00	1.43	61.2	182.3	161.4	140.5	.....	.....	.....	.....	.....	.....	.....
	3½×3 ×⅝	20.68	1.49	70.4	214.0	191.0	168.0	.....	.....	.....	.....	.....	.....	.....
	4 ×3 ×½	19.00	1.67	64.8	208.5	189.4	170.3	151.2	.....	.....	.....	.....	.....	.....
	4 ×3 ×⅝	21.92	1.74	74.8	244.5	223.4	202.3	181.2	160.1	.....	.....	.....	.....	.....
	5 ×3 ×½	21.00	2.16	71.6	254.3	238.0	221.7	205.4	189.1	172.8	156.5	.....	.....	.....
	5 ×3 ×⅝	24.44	2.25	83.2	300.0	281.8	263.6	245.4	227.2	209.0	190.8	.....	.....	.....
	5 ×3½×½	22.00	2.12	74.8	264.8	247.4	230.0	212.6	195.2	177.8	160.4	.....	.....	.....
	5 ×3½×⅝	25.68	2.19	87.6	312.4	292.7	273.0	253.3	233.6	213.9	194.2	.....	.....	.....

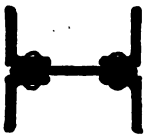


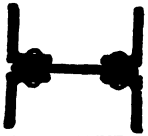
PLATE AND ANGLE COLUMNS

SAFE LOADS IN THOUSANDS OF POUNDS

Allowable unit stress $= 16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = least radius of gyration in inches $\qquad \frac{l}{r} < 125$



Plate, Inches	Angles	Area	r	Weight per Lineal Foot	Unsupported Length of Column in Feet									
					10	12	14	16	18	20	22	24	26	28
12×½	6 ×3½×½	24.09	2.62	81.6	306.6	291.3	276.0	260.7	245.4	230.1	214.8	199.5	184.2	.....
	6 ×3½×⅝	28.29	2.70	96.0	363.5	346.0	328.5	311.0	293.5	276.0	258.6	241.0	223.5	206.0
	6 ×3½×¾	32.24	2.78	110.0	418.5	399.1	379.7	360.3	340.9	321.5	302.1	282.7	263.3	243.9
	6 ×4 ×½	25.00	2.57	85.2	318.1	301.8	285.5	269.2	252.9	236.6	220.3	204.0	187.7	.....
	6 ×4 ×⅝	29.44	2.65	100.4	378.0	359.3	340.6	321.9	303.2	284.5	265.8	247.1	228.4	.....
	6 ×4 ×¾	33.76	2.72	114.8	435.3	414.5	393.7	372.9	352.1	331.3	310.5	289.7	268.9	248.1
14×¼	4 ×3 ×7/16	11.86	1.58	40.7	126.6	114.0	101.4	88.8	.....	.....	.....	.....	.....	.....
	4 ×3 ×⅝	13.42	1.63	45.9	145.7	131.9	118.1	104.3	.....	.....	.....	.....	.....	.....
	4 ×3 ×11/16	16.50	1.70	56.3	182.6	166.3	150.0	133.7	.....	.....	.....	.....	.....	.....
	5 ×3 ×7/16	13.10	2.07	44.7	156.3	145.7	135.1	124.5	113.9	103.3	.....	.....	.....	.....
	5 ×3 ×⅝	14.94	2.13	51.1	180.2	168.4	156.6	144.8	133.0	121.2	109.4	.....	.....	.....
	5 ×3 ×11/16	18.50	2.21	63.1	225.7	211.7	197.7	183.7	169.7	155.7	141.7	.....	.....	.....
	5 ×3½×7/16	15.70	2.06	53.5	187.9	175.1	162.4	149.7	137.0	124.3	.....	.....	.....	.....
	5 ×3½×11/16	19.50	2.16	66.3	236.2	221.0	205.8	190.6	175.4	160.2	145.0	.....	.....	.....
	6 ×3½×7/16	17.18	2.59	58.7	218.9	207.8	196.7	185.6	174.5	163.4	152.3	141.2	130.1	.....
	6 ×3½×11/16	21.50	2.68	73.1	276.3	262.9	249.5	236.1	222.7	209.3	195.9	182.5	169.1	.....
	6 ×4 ×7/16	17.94	2.54	61.1	227.6	215.8	204.0	192.2	180.4	168.6	156.8	145.0	133.2	.....
	6 ×4 ×½	22.5	2.62	76.7	287.9	273.5	259.1	244.7	230.3	215.9	201.5	187.1	172.7	.....
14×⅜	4 ×3 ×7/16	15.17	1.57	51.8	161.3	145.1	128.9	112.7	.....	.....	.....	.....	.....	.....
	4 ×3 ×½	18.25	1.66	62.3	199.5	181.1	162.7	144.3	.....	.....	.....	.....	.....	.....
	4 ×3 ×⅝	21.17	1.72	72.3	235.2	214.6	193.9	173.2	.....	.....	.....	.....	.....	.....
	5 ×3 ×7/16	16.69	2.05	57.1	198.7	185.0	171.3	157.6	143.9	130.2	.....	.....	.....	.....
	5 ×3 ×½	20.25	2.16	69.1	245.6	229.8	214.0	198.2	182.4	166.8	150.8	.....	.....	.....
	5 ×3 ×⅝	23.60	2.24	80.7	290.1	272.4	254.7	237.0	219.3	201.6	183.9	.....	.....	.....
	5 ×3½×7/16	17.45	2.01	59.5	206.2	191.7	177.2	162.7	148.2	133.7	.....	.....	.....	.....

Allowable unit stress = $16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = least radius of gyration in inches $\qquad \frac{l}{r} < 125$

Plate, Inches	Angles	Area	r	Weight per Lineal Foot	Unsupported Length of Column in Feet									
					10	12	14	16	18	20	22	24	26	28
14×⅜	5 ×3½×½	21.25	2.11	72.3	255.8	238.9	222.0	205.1	188.2	171.3	154.4	.....	.....	.....
	5 ×3½×⅝	24.93	2.18	85.1	302.6	283.4	264.2	245.0	225.8	206.6	187.4	.....	.....	.....
	6 ×3½×⅝	18.93	2.51	64.7	239.5	226.9	214.2	201.6	188.9	176.3	163.6	151.0	138.3	.....
	6 ×3½×½	23.25	2.62	79.1	297.9	283.0	268.0	253.1	238.1	223.2	208.2	193.3	178.3	.....
	6 ×3½×⅝	27.45	2.69	93.5	353.9	336.7	319.5	302.3	285.1	267.9	250.7	233.5	216.3	199.1
	6 ×3½×¾	31.49	2.76	107.5	408.8	389.6	370.4	351.2	332.0	312.8	293.6	274.4	255.2	236.0
	6 ×4 ×⅝	19.69	2.46	67.1	247.8	234.4	221.0	207.6	194.2	180.8	167.4	154.0	.....	.....
	6 ×4 ×½	24.25	2.57	82.7	309.0	293.2	277.3	261.5	245.6	229.8	213.9	198.1	182.2	.....
	6 ×4 ×⅝	28.69	2.64	97.9	367.9	349.7	331.5	313.3	295.1	276.9	258.7	240.5	222.3	.....
	6 ×4 ×¾	33.01	2.70	112.3	425.4	404.9	384.4	363.9	343.4	322.9	302.4	281.9	261.4	240.9
14×½	4 ×3 ×½	20.00	1.63	68.2	217.0	196.3	175.6	154.9	.....	.....	.....	.....	.....	.....
	4 ×3 ×⅝	22.92	1.70	78.2	253.5	230.9	208.3	185.7	.....	.....	.....	.....	.....	.....
	5 ×3 ×½	22.00	2.11	75.0	264.2	246.8	229.4	212.0	194.6	177.2	159.6	.....	.....	.....
	5 ×3 ×⅝	25.44	2.20	86.6	310.0	290.6	271.3	251.9	232.6	213.2	193.9	.....	.....	.....
	5 ×3½×½	23.00	2.07	78.2	274.8	256.2	237.6	219.0	200.4	181.8	.....	.....	.....	.....
	5 ×3½×⅝	26.68	2.15	91.0	322.2	301.4	280.6	259.8	239.0	218.2	197.4	.....	.....	.....
	6 ×3½×½	25.00	2.56	85.0	318.0	301.6	285.2	268.8	252.4	236.0	219.6	203.2	186.8	.....
	6 ×3½×⅝	29.20	2.66	99.4	375.2	356.8	338.4	320.0	301.6	283.2	264.8	246.4	228.0	.....
	6 ×3½×¾	33.24	2.73	113.4	430.0	409.5	389.1	368.6	348.2	327.7	307.3	286.8	266.4	245.9
	6 ×4 ×½	26.00	2.52	88.6	329.0	311.7	294.4	277.1	259.8	242.5	225.2	207.9	190.6	.....
	6 ×4 ×⅝	30.44	2.60	103.8	388.6	369.0	349.4	329.8	310.2	290.6	271.0	251.4	231.8	.....
	6 ×4 ×¾	34.76	2.68	118.2	446.0	424.3	402.6	380.9	359.2	337.5	315.8	294.1	272.4	250.7
16×¼	5 ×3 ×⅛	13.60	2.04	46.4	161.5	150.3	139.1	127.9	116.7	105.5	.....	.....	.....	.....
	5 ×3 ×⅜	15.44	2.09	52.8	185.0	172.6	160.2	147.8	135.4	123.0	.....	.....	.....	.....
	5 ×3 ×½	19.00	2.18	64.8	230.8	216.2	201.6	187.0	172.4	157.8	143.2	.....	.....	.....

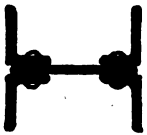
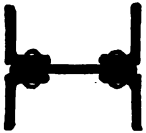


PLATE AND ANGLE COLUMNS
SAFE LOADS IN THOUSANDS OF POUNDS

Allowable unit stress = $16{,}000 - 70\,\frac{l}{r}$

l = unsupported length of column in inches

r = least radius of gyration in inches $\qquad \frac{l}{r} < 125$



Plate, Inches	Angles	Area	r	Weight per Lineal Foot	Unsupported Length of Column in Feet									
					10	12	14	16	18	20	22	24	26	28
16×¼	5 ×3½×⅜	16.20	2.05	55.2	192.8	179.6	166.4	153.2	140.0	126.8	.....	.....	.....	.....
	5 ×3½×½	20.00	2.13	68.0	241.0	225.3	209.6	193.9	178.2	162.5	146.8	.....	.....	.....
	6 ×3½×⅜	17.68	2.56	60.4	224.7	213.1	201.5	189.9	178.3	166.7	155.1	143.5	131.9	.....
	6 ×3½×½	22.00	2.64	74.8	282.0	268.0	254.0	240.0	226.0	212.0	198.0	184.0	170.0	.....
	6 ×4 ×⅜	18.44	2.50	62.8	233.2	220.8	208.4	196.0	183.6	171.2	158.8	146.4	134.0	.....
	6 ×4 ×½	23.00	2.59	78.4	293.6	278.7	263.8	248.9	234.0	219.1	204.2	189.3	174.4	.....
16×⅜	5 ×3 ×⅜	17.44	2.01	59.6	206.2	191.7	177.2	162.7	148.2	133.7	.....	.....	.....	.....
	5 ×3 ×½	21.00	2.12	71.6	252.9	236.3	219.7	203.1	186.5	169.9	153.3	.....	.....	.....
	5 ×3 ×⅝	24.44	2.20	83.2	298.0	279.3	260.6	241.9	223.2	204.5	185.8	.....	.....	.....
	5 ×3½×⅜	18.20	1.97	62.0	213.7	198.3	182.9	167.5	152.1	136.7	.....	.....	.....	.....
	5 ×3½×½	22.00	2.08	74.8	263.2	245.4	227.6	209.8	192.0	174.2	.....	.....	.....	.....
	5 ×3½×⅝	25.68	2.15	87.6	310.2	290.2	270.2	250.2	230.2	210.2	190.2	.....	.....	.....
	6 ×3½×⅜	19.68	2.46	67.2	247.9	234.4	220.9	207.4	193.9	180.4	166.9	153.4	139.9	.....
	6 ×3½×½	24.00	2.57	81.6	305.8	290.1	274.4	258.7	243.0	227.3	211.6	195.9	180.2	.....
	6 ×3½×⅝	28.20	2.65	96.0	362.0	344.1	326.2	308.3	290.4	272.5	254.6	236.7	218.8	200.9
	6 ×3½×¾	32.24	2.73	110.0	417.5	397.6	377.7	357.8	337.9	318.0	298.1	278.2	258.3	238.4
	6 ×4 ×⅝	29.44	2.41	99.6	256.2	241.9	227.6	213.3	199.0	184.7	170.4	156.1	.....	.....
	6 ×4 ×½	25.00	2.53	85.2	316.9	300.3	283.7	267.1	250.5	233.9	217.3	200.7	184.1	.....
	6 ×4 ×⅝	29.44	2.60	100.4	376.0	357.0	338.0	319.0	300.0	281.0	262.0	243.0	224.0	.....
	6 ×4 ×¾	33.76	2.67	114.8	434.0	412.8	391.6	370.4	349.2	328.0	306.8	285.6	264.4	243.2
16×½	5 ×3 ×½	23.00	2.06	78.4	274.3	255.6	236.9	218.2	199.5	180.8	.....	.....	.....	.....
	5 ×3 ×⅝	26.44	2.16	90.0	320.5	299.9	279.4	258.8	238.3	217.7	197.2	.....	.....	.....
	5 ×3½×½	24.00	2.03	81.6	284.4	264.6	244.8	225.0	205.2	185.4	.....	.....	.....	.....
	5 ×3½×⅝	27.68	2.11	94.4	332.8	310.8	288.8	266.8	244.8	222.8	200.8	.....	.....	.....
	6 ×3½×½	26.00	2.51	88.4	328.8	311.4	294.0	276.6	259.2	241.8	224.4	207.0	189.6	.....

Allowable unit stress = $16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = least radius of gyration in inches $\frac{l}{r} < 125$

Plate, Inches	Angles	Area	r	Weight per Lineal Foot	Unsupported Length of Column in Feet									
					10	12	14	16	18	20	22	24	26	28
16×½	6 ×3½×5/16	30.20	2.61	102.8	386.0	366.6	347.2	327.8	308.4	289.0	269.6	250.2	230.6	.....
	6 ×3½×¾	34.24	2.69	116.8	441.0	419.6	398.2	376.8	355.4	334.0	312.6	291.2	269.8	284.4
	6 ×4 ×½	27.00	2.47	92.0	340.0	321.7	303.4	285.1	266.8	248.5	230.2	211.8	.....	.....
	6 ×4 ×5/16	31.44	2.56	107.2	400.0	379.4	358.8	338.2	317.6	297.0	276.4	255.8	235.2	.....
	6 ×4 ×¾	35.76	2.64	121.6	458.0	435.3	412.6	389.9	367.2	344.5	321.8	299.1	276.4	253.7
18×¼	6 ×3½×5/16	18.18	2.52	62.1	230.0	217.9	205.9	193.8	181.8	169.7	157.7	145.6	133.6	.....
	6 ×3½×⅜	22.50	2.62	76.5	287.9	273.5	259.1	244.7	230.3	215.9	201.5	187.1	172.7	.....
	6 ×4 ×5/16	18.94	2.47	64.5	238.6	225.8	213.0	200.2	187.4	174.6	161.8	149.0	.....	.....
	6 ×4 ×½	23.50	2.56	80.1	298.8	283.4	268.0	252.6	237.2	221.8	206.4	191.0	175.6	.....
18×⅜	6 ×3½×5/16	20.43	2.42	69.8	256.2	242.0	227.8	213.6	199.4	185.2	171.0	156.8	.....	.....
	6 ×3½×⅜	24.75	2.53	84.2	313.7	297.3	280.9	264.5	248.1	231.7	215.3	198.9	182.5	.....
	6 ×3½×7/16	28.95	2.62	98.6	370.0	351.5	333.0	314.5	296.0	277.5	259.0	240.5	222.0	.....
	6 ×3½×½	32.99	2.70	112.6	425.0	404.6	384.1	363.7	343.2	322.8	302.3	281.9	261.4	241.0
	6 ×4 ×5/16	21.19	2.37	72.2	264.0	249.0	234.0	219.0	204.0	189.0	174.0	159.0	.....	.....
	6 ×4 ×⅜	25.75	2.49	87.8	325.4	308.1	290.8	273.5	256.2	238.9	221.6	204.3	187.0	.....
	6 ×4 ×7/16	30.19	2.57	103.0	384.3	364.6	344.9	325.2	305.5	285.8	266.1	246.4	226.7	.....
	6 ×4 ×½	34.51	2.64	117.4	442.0	420.0	398.0	376.0	354.0	332.0	310.0	288.0	266.0	.....
18×½	6 ×3½×7/16	27.00	2.47	91.8	340.0	321.6	303.3	284.9	266.6	248.2	229.9	211.5	193.2	.....
	6 ×3½×½	31.20	2.57	106.2	397.0	376.7	356.4	336.1	315.8	295.5	275.2	254.9	234.6	.....
	6 ×3½×¾	35.24	2.66	120.2	452.5	430.2	408.0	385.7	363.5	341.2	319.0	296.7	274.5	252.2
	6 ×4 ×½	28.00	2.43	95.4	351.0	331.7	312.4	293.1	273.8	254.5	235.2	215.9	.....	.....
	6 ×4 ×9/16	32.44	2.52	110.6	411.0	389.4	367.8	346.2	324.6	303.0	281.4	259.8	238.2	.....
	6 ×4 ×¾	36.76	2.60	125.0	469.2	445.5	421.8	398.1	374.4	350.7	327.0	303.3	279.6	.....

LATTICED CHANNEL COLUMNS

SAFE LOADS IN THOUSANDS OF POUNDS

Allowable unit stress $= 16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = corresponding radius of gyration in inches

To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Depth of Channel, Inches	Weight of each Channel, Pounds	Area of Column Section	Least r	Distance A, Inches	Unsupported Length of Column in Feet												
					8	10	12	14	16	18	20	22	24	26	28	30	32	34
6	8.0	4.76	2.34	4	62	59	55	52	48	45	41	38	34	31	27	.....	.....	.....
	10.5	6.18	2.21	4	80	75	70	66	61	56	52	47	42	38	33	.....	.....	.....
	13.0	7.64	2.13	4	98	92	86	80	73	67	61	55	49	43	.....	.....	.....	.....
	15.5	9.12	2.06	4	116	108	101	93	86	78	71	64	56	49	.....	.....	.....	.....
7	9.75	5.70	2.72	4¼	77	73	70	66	63	59	56	52	49	45	42	38	35	31
	12.25	7.20	2.59	4¼	96	91	87	82	77	73	68	63	59	54	49	45	40	.....
	14.75	8.68	2.50	4¼	115	109	103	98	92	86	80	74	69	63	57	51	.....	.....
	17.25	10.14	2.44	4¼	134	127	120	113	106	99	92	85	78	71	64	57	.....	.....
	19.75	11.62	2.39	4¼	153	145	137	129	120	112	104	96	88	80	72	.....	.....	.....
8	11.25	6.70	3.11	5½	92	89	85	81	78	74	71	67	63	60	56	53	49	45
	13.75	8.06	2.99	5½	111	106	102	97	93	88	83	79	74	70	65	61	56	52
	16.25	9.56	2.89	5½	130	125	119	113	108	102	97	91	86	80	74	69	63	58
	18.75	11.02	2.82	5½	149	143	136	130	123	117	110	104	97	91	84	78	71	65
	21.25	12.50	2.77	5½	169	162	154	146	139	131	124	116	109	101	93	86	78	71

Depth of Channel, Inches	Weight of Channel, Pounds	Area of Section	r	Thickness of Web, Inches	Safe Loads in Thousands of Pounds for Spans in Feet												
					8	10	12	14	16	18	20	22	24	26	28	30	32	34
9	13.25	7.78	3.45	6	108	105	101	97	94	90	86	82	79	75	71	67	64	60
	15.00	8.82	3.37	6	123	119	114	110	105	101	97	92	88	83	79	74	70	66
	20.0	11.76	3.20	6	163	157	151	144	138	132	126	120	114	107	101	95	89	83
	25.0	14.70	3.08	6	203	195	187	179	171	163	155	147	139	131	123	115	107	99
10	15.0	8.92	3.84	6¾	123	123	118	115	111	107	103	100	95	91	88	84	80	76
	20.0	11.76	3.66	6¾	164	161	155	150	144	139	134	128	123	118	112	107	101	96
	25.0	14.70	3.52	6¾	208	200	193	186	179	172	165	158	151	144	137	130	123	116
	30.0	17.64	3.41	6¾	247	238	230	221	212	204	195	186	177	169	160	152	143	134
	35.0	20.58	3.31	6¾	288	276	266	256	245	235	224	214	203	193	183	172	162	151
12	20.5	12.06	4.61	8¼	168	168	168	166	162	157	153	145	144	140	135	131	127	122	118
	25.0	14.70	4.43	8¼	205	205	201	196	190	185	179	173	168	162	157	151	146	140
	30.0	17.64	4.28	8¼	247	247	240	233	226	220	213	206	199	192	185	178	171	164
	35.0	20.58	4.17	8¼	288	288	279	271	263	254	246	238	229	221	213	205	196	188
	40.0	23.52	4.09	8¼	329	327	318	308	298	289	279	270	260	250	241	231	221	212
15	33.0	19.80	5.59	10¼	277	277	277	275	269	263	257	251	245	239	233	227	221	215
	35.0	20.58	5.56	10¼	288	288	288	285	279	273	267	260	254	248	242	236	229	223
	40.0	23.52	5.44	10¼	329	329	329	325	318	310	303	296	289	281	274	267	260	252
	45.0	26.48	5.32	10¼	370	370	370	366	357	349	341	332	324	316	307	299	289	281
	50.0	29.42	5.23	10¼	411	411	411	404	395	386	376	366	357	347	338	329	319	310
	55.0	32.36	5.16	10¼	453	453	453	444	433	422	412	401	391	380	370	359	349	338

Maximum unit stress = 14,000 pounds.

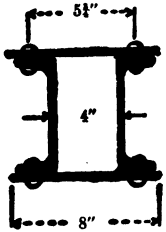
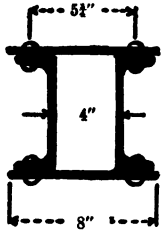


PLATE AND CHANNEL COLUMNS

SAFE LOADS IN THOUSANDS OF POUNDS

6 INCH CHANNELS



Allowable unit stress = $16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches.

r = corresponding radius of gyration in inches

To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Weight of each Channel	Thickness of Plates	Weight of Column	Area of Column Section	Least Radius of Gyration	Length in Feet										
Pounds per Foot	Inch	Pounds per Foot	Square Inches	Inches	4	6	8	10	12	14	16	18	20	22	24
8	¼	29.6	8.76	2.35	122	121	114	108	102	96	89	83	77	71	65
	5/16	33.0	9.76	2.35	136	135	128	121	114	107	100	93	86	79	72
	3/8	36.4	10.76	2.34	150	149	141	133	125	117	110	102	94	86	79
	7/16	39.8	11.76	2.34	164	162	153	145	136	128	119	111	102	94	86
	½	43.2	12.76	2.34	178	176	166	157	148	139	130	121	112	103	94
	9/16	46.6	13.76	2.34	192	190	180	170	160	150	140	130	120	110	101
	5/8	50.0	14.76	2.33	206	200	189	179	169	159	148	138	128	118	108
10.5	¼	34.6	10.18	2.27	142	140	132	124	117	109	102	94	87	79	72
	5/16	38.0	11.18	2.27	156	154	145	137	128	120	112	103	95	87	79
	3/8	41.4	12.18	2.28	170	168	159	150	141	132	123	114	105	96	87
	7/16	44.8	13.18	2.28	184	181	171	161	151	142	132	122	113	103	94

Weight of each Channel	Thickness of Plates	Weight of Column	Area of Column Section	Radius of Gyration	LENGTH IN FEET										
Pounds per Foot	Inch	Pounds per Foot	Square Inches	Inches	4	6	8	10	12	14	16	18	20	22	24
10.5	1/2	48.2	14.18	2.28	198	195	184	174	163	153	142	132	121	111	101
	11/16	51.6	15.18	2.28	212	209	197	186	175	164	152	141	130	119	108
	5/8	55.0	16.18	2.28	226	223	211	199	187	175	163	151	139	127	115
13	1/4	39.6	11.64	2.20	163	159	150	141	132	123	114	105	96	87	79
	13/16	43.0	12.64	2.21	177	173	163	153	143	134	124	114	105	95	86
	5/8	46.4	13.64	2.22	191	187	176	166	155	145	135	124	114	104	94
	15/16	49.8	14.64	2.23	205	201	189	178	167	156	145	134	123	112	101
	1/2	53.2	15.64	2.23	219	214	201	189	178	166	154	143	131	119	108
	1/16	56.6	16.64	2.24	233	228	215	202	190	178	165	153	140	128	116
	5/8	60.0	17.64	2.24	247	242	228	215	202	189	175	162	149	136	123
15.5	1/4	44.6	13.12	2.14	183	179	168	158	147	137	127	116	106	96	86
	13/16	48.0	14.12	2.15	197	192	181	170	159	148	137	126	115	104	93
	5/8	51.4	15.12	2.16	211	206	193	181	170	158	146	135	123	111	100
	15/16	54.8	16.12	2.17	225	220	207	194	182	170	157	145	132	120	108
	1/2	58.2	17.12	2.18	239	234	220	207	194	181	167	154	141	128	115
	1/16	61.6	18.12	2.19	253	248	234	220	206	192	178	164	150	136	123
	5/8	65.0	19.12	2.19	267	262	247	232	217	202	188	173	158	143	129

Maximum unit stress = 14,000 pounds per square inch.

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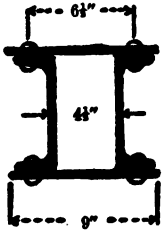
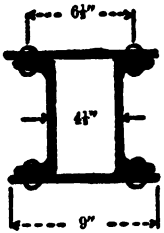


PLATE AND CHANNEL COLUMNS

SAFE LOADS IN THOUSANDS OF POUNDS

7 INCH CHANNELS



Allowable unit stress $= 16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = corresponding radius of gyration in inches

To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Weight of each Channel	Thickness of Plates	Weight of Column	Area of Column Section	Least Radius of Gyration	Length in Feet												
Pounds per Foot	Inch	Pounds per Foot	Square Inches	Inches	4	6	8	10	12	14	16	18	20	22	24	26	28
9.75	¼	34.8	10.20	2.63	142	142	137	130	123	117	110	104	97	91	84	78	71
	5/16	38.6	11.32	2.63	158	158	152	144	137	130	123	115	108	101	94	87	79
	3/8	42.5	12.45	2.62	174	174	167	159	151	143	135	127	119	111	103	95	87
	7/16	46.3	13.58	2.62	190	190	182	173	164	156	147	138	130	121	112	104	95
	½	50.1	14.70	2.62	205	205	197	187	178	168	159	149	140	130	121	112	102
	9/16	53.9	15.82	2.62	221	221	212	201	191	181	171	161	151	141	131	121	111
	5/8	57.8	16.95	2.62	237	237	227	216	205	194	183	172	161	150	140	129	118
12.25	¼	39.8	11.70	2.55	163	163	156	148	140	132	124	117	109	101	93	86	78
	5/16	43.6	12.82	2.56	179	179	174	165	156	147	138	130	121	112	103	95	86
	3/8	47.5	13.95	2.56	195	195	189	179	170	160	151	141	132	122	113	104	94
	7/16	51.3	15.08	2.56	211	211	204	193	183	173	163	152	142	132	122	112	101

Channel	Plates	Column	Section	Gyration													
Pounds per Foot	Inch	Pounds per Foot	Square Inches	Inches	4	6	8	10	12	14	16	18	20	22	24	26	28
13.25	⅛	55.1	16.20	2.57	226	226	216	204	192	181	169	158	146	135	123	121	109
	¼	58.9	17.32	2.57	242	242	231	219	208	196	185	174	162	151	140	129	117
	⅜	62.8	18.45	2.57	258	258	246	234	222	210	198	186	174	162	150	138	126
14.75	¼	44.8	13.18	2.49	184	184	175	166	157	148	139	130	121	112	103	95	86
	⅜	48.6	14.30	2.50	201	199	189	179	170	160	151	141	131	122	112	103	93
	½	52.5	15.43	2.50	216	215	204	194	184	173	163	153	142	132	122	112	101
	⅝	56.3	16.56	2.51	231	231	219	208	197	186	175	164	153	142	131	120	108
	¾	60.1	17.68	2.52	247	247	235	223	211	199	188	176	164	152	140	129	117
	⅞	63.9	18.80	2.52	263	263	250	237	225	212	200	187	174	162	149	137	124
	1	67.8	19.93	2.53	279	279	265	252	239	225	212	199	185	172	159	146	132
17.25	¼	49.8	14.64	2.42	204	203	192	182	172	162	152	142	132	122	112	102	92
	⅜	53.6	15.76	2.43	220	219	208	197	186	175	164	153	142	131	120	110	99
	½	57.5	16.89	2.45	236	235	223	211	200	188	177	165	153	142	130	119	107
	⅝	61.3	18.02	2.46	252	251	238	226	214	201	189	177	164	152	140	128	115
	¾	65.1	19.14	2.46	267	267	253	240	227	214	201	188	175	162	149	136	123
	⅞	68.9	20.26	2.47	283	282	268	254	240	227	213	199	186	172	158	145	131
	1	72.8	21.39	2.48	299	298	283	269	254	240	225	211	196	182	167	153	138
19.75	¼	54.8	16.12	2.37	225	223	212	200	189	177	166	155	143	132	120	109	97
	⅜	58.6	17.24	2.38	241	239	226	214	202	190	178	165	153	141	129	117	104
	½	62.5	18.37	2.40	257	255	242	229	216	203	190	177	164	151	138	126	113
	⅝	66.3	19.50	2.41	273	271	257	243	229	215	201	187	173	159	145	132	118
	¾	70.1	20.62	2.42	288	287	272	258	243	229	215	200	186	171	157	143	128
	⅞	73.9	21.74	2.43	304	302	287	272	257	242	227	212	197	182	167	152	137
	1	77.8	22.87	2.44	320	318	302	286	270	255	239	223	208	192	176	161	145

Maximum unit stress = 14,000 pounds per square inch.

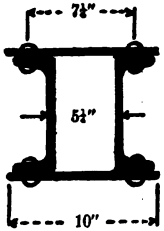


PLATE AND CHANNEL COLUMNS

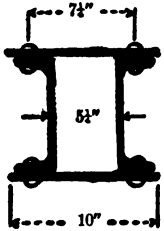
SAFE LOADS IN THOUSANDS OF POUNDS

8 INCH CHANNELS

Allowable unit stress $= 16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = corresponding radius of gyration in inches



To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Weight of each Channel	Thickness of Plates	Weight of Column	Area of Column Section	Least Radius of Gyration	Length in Feet											
Pounds per Foot	Inch	Pounds per Foot	Square Inches	Inches	6	8	10	12	14	16	18	20	22	24	26	28	30
11.25	¼	39.5	11.70	2.98	163	159	152	146	139	133	126	120	113	107	100	94	88
	5/16	43.7	12.95	2.97	181	177	169	162	155	147	140	133	126	118	111	104	97
	3/8	48.0	14.20	2.97	198	195	186	178	170	162	154	146	138	130	122	114	106
	7/16	52.3	15.45	2.96	216	212	203	194	185	176	167	159	150	141	132	123	115
	½	56.5	16.70	2.95	233	229	220	210	201	191	181	172	162	152	143	133	124
	9/16	60.8	17.95	2.95	251	246	235	225	215	204	194	184	174	163	153	143	133
	5/8	65.0	19.20	2.95	268	263	252	241	230	219	208	197	186	175	164	153	143
13.75	¼	44.5	13.08	2.92	183	179	171	163	156	148	141	133	126	118	111	103	96
	5/16	48.7	14.33	2.92	200	196	187	179	171	162	154	146	138	129	121	113	105
	3/8	53.0	15.58	2.92	218	213	204	195	186	177	168	159	150	141	132	123	114
	7/16	57.3	16.83	2.91	235	230	220	210	200	190	180	170	161	152	142	132	123

Channel	Plates	Column	Section	Gyration	Unsupported Length in Feet											
Pounds per Foot	Inch	Pounds per Foot	Square Inches	Inches	6	8	10	12	14	16	18	20	22	24	26	28	30
13.75	½	61.5	18.08	2.91	253	247	236	226	215	205	194	184	173	163	152	142	132
	9/16	65.8	19.33	2.91	270	264	252	241	230	219	208	196	185	174	163	152	141
	⅝	70.0	20.58	2.91	288	281	269	257	245	233	221	210	198	186	174	162	151
16.25	¼	49.5	14.56	2.86	203	198	189	180	172	163	155	146	138	129	121	112	104
	7/16	53.7	15.81	2.87	221	215	206	197	188	178	169	160	151	141	132	123	114
	9/16	58.0	17.06	2.87	238	233	223	213	203	193	183	173	163	153	143	133	123
	11/16	62.3	18.31	2.87	256	250	239	228	217	207	196	185	175	164	153	142	132
	½	66.5	19.56	2.87	273	267	255	244	232	221	209	198	186	175	163	152	141
	9/16	70.8	20.81	2.87	291	284	271	259	247	235	223	210	198	186	174	162	150
	⅝	75.0	22.06	2.87	308	301	288	275	262	249	236	223	210	197	184	171	159
18.75	¼	54.5	16.02	2.81	224	218	208	198	189	179	169	160	150	140	131	121	112
	7/16	58.7	17.27	2.81	241	235	224	214	203	193	183	172	162	152	141	131	121
	9/16	63.0	18.52	2.82	259	252	240	229	218	207	196	185	174	163	152	141	130
	11/16	67.3	19.77	2.82	276	269	257	245	233	221	209	198	186	174	162	150	139
	½	71.5	21.02	2.83	294	286	273	261	248	236	223	211	198	186	173	161	149
	9/16	75.8	22.27	2.83	311	303	289	276	263	250	237	223	210	197	184	171	158
	⅝	80.0	23.52	2.83	329	320	306	292	278	264	250	236	222	208	194	180	166
21.25	¼	59.5	17.50	2.76	245	237	226	215	205	194	183	173	162	151	141	130	120
	7/16	63.7	18.75	2.77	262	254	242	231	219	208	197	185	174	163	151	140	129
	9/16	68.0	20.00	2.77	280	271	259	246	234	222	210	198	186	174	162	150	138
	11/16	72.3	21.25	2.78	297	288	275	262	249	236	223	211	198	185	172	159	147
	½	76.5	22.50	2.79	315	305	291	277	264	250	237	223	210	196	183	169	156
	9/16	80.8	23.75	2.79	332	322	307	293	279	264	250	236	222	207	193	179	165
	⅝	85.0	25.00	2.80	350	340	325	310	295	280	265	250	235	220	205	190	175

Maximum unit stress = 14,000 pounds per square inch.

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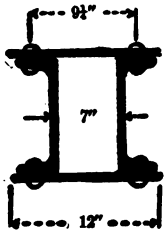


PLATE AND CHANNEL COLUMNS

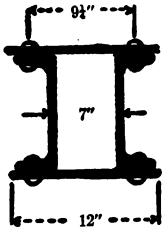
SAFE LOADS IN THOUSANDS OF POUNDS

9 INCH CHANNELS

Allowable unit stress = $16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = corresponding radius of gyration in inches



To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Weight of each Channel	Thickness of Plates	Weight of Column	Area of of Column Section	Least Radius of Gyration	Length in Feet														
Pounds per Foot	Inch	Pounds per Foot	Square Inches	Inches	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
13.25	¼	46.9	13.78	3.72	192	189	182	176	170	164	158	151	145	139	133	127	120	114	108	102	96
	5/16	51.9	15.28	3.70	213	209	202	195	188	181	174	167	160	153	146	139	132	125	118	111	105
	⅜	57.1	16.78	3.68	234	230	222	214	206	199	191	183	176	168	160	153	145	137	130	122	115
	7/16	62.2	18.28	3.66	255	250	241	233	224	216	208	199	191	182	174	166	157	149	140	132	124
	½	67.3	19.78	3.64	276	270	260	251	242	233	224	215	206	197	188	179	170	161	152	143	134
	9/16	72.3	21.28	3.63	297	291	281	271	261	251	241	231	221	212	202	192	182	172	162	152	143
	⅝	77.4	22.78	3.62	318	311	300	289	279	268	258	247	237	226	216	205	195	184	174	163	153
15.00	¼	50.4	14.82	3.68	207	203	196	189	182	176	169	162	155	149	142	135	128	122	115	108	102
	5/16	55.4	16.32	3.66	228	223	215	207	200	193	185	178	170	163	155	148	140	133	125	118	111
	⅜	60.6	17.82	3.65	249	244	235	227	219	211	203	194	186	178	170	162	153	145	137	129	121
	7/16	65.7	19.32	3.63	270	264	255	246	237	228	219	210	201	192	183	174	165	156	147	138	130

CHICAGO—JOSEPH T. RYERSON & SON—NEW YORK

Channel	Plates	Column	Section	Gyration																
Pounds per Foot	Inch	Pounds per Foot	Square Inches	Inches	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
15.00	¼	70.8	20.82	3.62	291	284	274	264	255	245	236	226	216	207	197	188	178	168	159	149	140
	⅜	75.8	22.32	3.61	312	305	294	284	273	263	253	242	232	221	211	201	190	180	169	159	149
	½	80.9	23.82	3.60	333	325	313	302	291	280	269	258	247	236	225	214	203	192	181	170	159
20.00	¼	60.4	17.76	3.62	248	243	234	226	218	209	201	193	185	176	168	160	152	143	135	127	119
	⅜	65.4	19.26	3.61	269	263	254	245	236	227	218	209	200	191	182	173	164	155	146	137	129
	½	70.6	20.76	3.60	290	283	273	263	253	244	234	224	215	205	195	186	176	166	157	147	138
	⅝	75.7	22.26	3.59	311	304	293	282	272	262	251	241	230	220	209	199	188	178	167	157	147
	¾	80.8	23.76	3.58	332	324	312	301	290	279	268	257	246	234	223	212	201	190	179	168	157
	⅞	85.8	25.26	3.57	353	344	332	320	308	296	284	272	260	249	237	225	213	201	189	177	166
	1	90.9	26.76	3.57	374	365	352	339	327	314	302	289	276	264	251	239	226	213	201	188	176
25.00	¼	70.4	20.70	3.52	289	281	271	261	251	241	231	221	211	202	192	182	172	162	152	142	133
	⅜	75.4	22.20	3.51	310	302	291	280	270	259	249	238	227	217	206	196	185	174	164	153	143
	½	80.6	23.70	3.51	331	322	310	299	287	276	265	253	242	231	219	208	197	185	174	163	152
	⅝	85.7	25.20	3.51	352	342	330	318	306	294	282	270	258	246	234	222	210	198	186	174	162
	¾	90.8	26.70	3.51	373	363	350	337	324	311	299	286	273	260	247	235	222	209	196	183	171
	⅞	92.8	28.20	3.50	394	383	369	355	342	329	315	302	288	275	261	248	234	221	207	194	181
	1	100.9	29.70	3.50	415	404	389	375	361	346	332	318	304	289	275	261	247	232	218	204	190

Maximum unit stress=14,000 pounds per square inch.

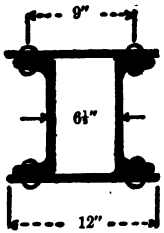
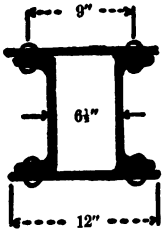


PLATE AND CHANNEL COLUMNS

SAFE LOADS IN THOUSANDS OF POUNDS

10 INCH CHANNELS



Allowable unit stress = $16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = corresponding radius of gyration in inches

To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Weight of each Channel	Thickness of Plates	Weight of Column	Area of Column Section	Least Radius of Gyration	Length in Feet																
Pounds per Foot	Inch	Pounds per Foot	Square Inches	Inches	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
15	¼	50.4	14.92	3.62	208	208	204	197	190	183	176	169	162	155	148	141	134	127	120	113	106	100
	5/16	55.5	16.42	3.61	229	229	224	216	208	200	193	185	177	170	162	154	147	139	131	124	116	109
	⅜	60.6	17.92	3.59	250	250	244	235	227	218	210	202	193	185	177	168	160	152	143	135	127	119
	7/16	65.7	19.42	3.58	271	271	265	255	246	237	228	219	210	201	191	182	173	164	155	146	137	128
	½	70.8	20.92	3.58	292	292	285	275	265	255	245	236	226	216	206	196	187	177	167	157	147	138
	9/16	75.9	22.42	3.57	313	313	305	294	283	273	262	252	241	231	220	210	199	189	178	168	157	147
	⅝	81.0	23.92	3.56	334	334	326	314	303	291	280	269	257	246	235	223	212	201	189	178	167	156
20	¼	60.4	17.76	3.52	248	248	241	232	223	215	207	198	190	181	173	164	156	147	139	130	122	114
	5/16	65.5	19.26	3.52	269	262	262	252	243	234	225	216	206	197	188	179	170	160	151	142	133	124
	⅜	70.6	20.76	3.51	290	290	282	272	262	252	242	232	222	212	202	192	182	172	162	152	142	133
	7/16	75.7	22.26	3.51	311	311	302	291	280	270	259	249	238	227	217	206	196	185	174	164	153	143

Pounds per Foot	Inch	Pounds per Foot	Square Inches	Inches	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
20	½	80.8	23.76	3.51	332	332	323	311	300	288	277	266	254	243	231	220	209	197	186	174	163	152
	9/16	85.9	25.26	3.50	353	353	343	330	318	306	294	282	270	258	245	233	221	209	197	185	173	161
	5/8	91.0	26.76	3.50	374	374	363	350	337	324	311	299	286	273	260	247	235	222	209	196	183	171
25	¼	70.4	20.70	3.42	289	289	280	269	259	249	239	229	218	208	198	188	178	167	157	147	137	127
	7/16	75.5	22.20	3.43	310	310	300	289	278	267	256	245	234	223	213	202	191	180	169	158	147	137
	1/2	80.6	23.70	3.43	331	331	321	309	297	286	274	263	251	239	228	216	205	193	181	170	158	147
	9/16	85.7	25.20	3.43	352	352	341	328	316	303	291	279	266	254	242	229	217	205	192	180	168	156
	5/8	90.8	26.70	3.43	373	373	361	347	334	321	308	295	282	269	256	243	230	217	204	191	178	165
	11/16	95.9	28.20	3.44	394	394	382	368	354	340	326	313	299	285	271	257	244	230	216	202	188	175
	¾	101.0	29.70	3.44	415	415	402	387	372	358	344	329	315	300	286	271	257	242	228	213	199	185
30	¼	80.4	23.64	3.33	330	330	317	306	294	282	270	258	246	234	222	210	198	186	174	162	150	139
	7/16	85.5	25.14	3.34	351	343	330	318	306	294	282	270	258	245	233	221	209	197	185	173	161	149
	1/2	90.6	26.64	3.35	372	372	358	345	332	318	305	292	278	265	252	238	225	212	198	185	172	159
	9/16	95.7	28.14	3.36	393	393	384	369	355	340	326	312	297	283	268	254	240	225	211	196	182	168
	5/8	100.8	29.64	3.36	414	414	405	389	374	359	344	329	313	298	283	268	253	237	222	207	192	177
	11/16	105.9	31.14	3.37	435	435	420	404	388	373	357	342	326	311	295	280	264	249	233	218	202	187
	¾	111.0	32.64	3.37	456	456	440	423	407	391	374	358	342	326	309	293	277	261	244	228	212	196
35	¼	90.4	26.58	3.26	372	370	356	342	328	315	301	287	274	260	246	233	219	205	192	178	164	151
	7/16	95.5	28.08	3.27	393	391	376	362	347	333	318	304	289	275	261	246	232	217	203	188	174	160
	1/2	100.6	29.58	3.28	414	412	396	381	366	351	336	321	306	290	275	260	245	230	215	200	185	170
	9/16	105.7	31.08	3.29	435	433	417	401	385	369	353	337	321	305	290	274	258	242	226	210	194	179
	5/8	110.8	32.58	3.29	456	454	438	421	404	388	371	354	338	321	304	288	271	254	238	221	204	188
	11/16	115.9	34.08	3.30	477	475	457	440	423	405	388	371	353	336	319	301	284	267	249	232	215	198
	¾	121.0	35.58	3.31	498	497	478	460	442	424	406	388	370	352	334	316	298	280	262	244	226	208

Maximum unit stress = 14,000 pounds per square inch.

B 67
ed.
ed below.

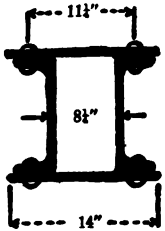
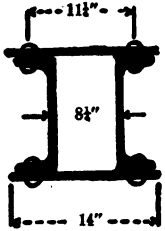


PLATE AND CHANNEL COLUMNS

SAFE LOADS IN THOUSANDS OF POUNDS

12 INCH CHANNELS



Allowable unit stress $= 16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = corresponding radius of gyration in inches

To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Weight of each Channel	Thickness of Plates	Weight of Column	Area of Column Section	Least Radius of Gyration	Length in Feet																	
Pounds per Foot	Inch	Pounds per Foot	Square Inches	Inches	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44
20.5	¼	64.8	19.06	4.41	266	266	261	253	246	239	232	224	217	210	203	195	188	181	174	166	159	152	145
	5/16	70.8	20.81	4.38	291	291	285	277	269	261	253	245	237	229	221	213	205	197	189	181	173	165	157
	⅜	76.7	22.56	4.36	315	315	308	299	290	281	273	264	255	247	238	229	221	212	203	195	186	177	169
	7/16	82.7	24.31	4.34	340	340	332	322	313	303	294	284	275	265	256	247	237	228	218	209	199	190	181
	½	88.6	26.06	4.33	364	364	356	345	335	325	315	305	295	285	274	264	254	244	234	224	214	204	194
	9/16	94.6	27.81	4.30	389	389	379	368	357	346	335	324	313	302	291	281	270	259	248	237	226	215	205
	⅝	100.5	29.56	4.28	413	413	403	391	379	368	356	344	333	321	309	298	286	275	263	251	240	228	217
25	¼	73.8	21.70	4.35	303	303	296	287	279	270	262	254	245	237	228	220	212	203	195	187	178	170	162
	5/16	79.8	23.45	4.32	328	328	320	310	301	292	283	274	265	256	246	237	228	219	210	201	192	183	174
	⅜	85.7	25.20	4.31	353	352	344	334	324	314	304	294	285	275	265	255	245	236	226	216	206	196	187
	7/16	91.7	26.95	4.29	377	377	367	356	346	335	325	314	304	293	283	272	262	251	241	230	220	209	199

CHICAGO—Joseph T. Ryerson & Son—New York

Channel	Plates	Column	Section	Gyration																		
Pounds per Foot	Inch	Pounds per Foot	Square Inches	Inches	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44
25	½	97.6	28.70	4.27	401	401	391	379	368	357	345	334	323	311	300	289	277	266	255	243	232	221	210
	⅝	103.6	30.45	4.26	426	426	415	403	391	379	367	355	343	331	319	307	295	283	271	259	247	235	223
	¾	109.5	32.20	4.25	450	450	438	425	412	399	387	374	361	349	336	323	311	298	285	273	260	247	235
30	¼	83.8	24.64	4.27	344	344	336	326	316	306	297	287	277	267	258	248	238	228	219	209	199	189	180
	⅜	89.8	26.39	4.26	369	369	359	348	338	327	317	307	296	286	275	265	255	244	234	224	213	203	193
	½	95.7	28.14	4.25	393	393	383	371	360	349	338	327	316	305	293	282	271	260	249	238	227	216	205
	⅝	101.7	29.89	4.23	418	418	407	395	383	371	359	347	335	323	311	300	288	276	264	252	240	228	217
	¾	107.6	3.164	4.22	442	442	430	417	404	392	379	367	354	342	329	316	304	291	279	266	254	241	229
	⅞	113.6	33.39	4.21	467	467	454	440	427	414	400	387	374	360	347	334	320	307	294	280	267	254	241
	1	119.5	35.14	4.21	491	491	478	463	449	435	421	407	393	379	365	351	337	323	309	295	281	267	253
35	¼	93.8	27.58	4.19	386	386	374	363	352	341	330	319	308	296	285	274	263	252	241	230	219	208	197
	⅜	99.8	29.33	4.18	410	410	398	386	374	362	350	339	327	315	303	291	279	268	256	244	232	220	209
	½	105.7	31.08	4.18	435	434	421	409	396	384	371	359	346	334	321	309	296	284	271	259	246	234	222
	⅝	111.7	32.83	4.17	459	459	445	432	419	405	392	379	366	353	339	326	313	300	286	273	260	247	234
	¾	117.6	34.58	4.16	484	483	469	455	441	427	413	399	385	371	357	343	329	315	301	287	273	259	246
	⅞	123.6	36.33	4.16	508	507	492	477	462	448	433	419	404	389	375	360	345	331	316	301	287	272	258
	1	129.5	38.08	4.15	533	532	516	501	485	470	454	439	424	408	393	377	362	347	331	316	300	285	270
40	¼	103.8	30.52	4.13	427	426	413	401	388	376	363	351	339	326	314	301	289	277	264	252	239	227	215
	⅜	109.8	32.27	4.12	451	450	436	423	410	397	384	370	357	344	331	318	305	291	278	265	252	239	226
	½	115.7	34.02	4.12	476	474	460	446	432	418	404	391	377	363	349	335	321	308	294	280	266	252	239
	⅝	121.7	35.77	4.12	500	499	484	469	455	440	425	411	396	382	367	353	338	323	309	294	280	265	251
	¾	127.6	37.52	4.11	525	523	507	492	476	461	446	430	415	400	384	369	354	338	323	308	292	277	262
	⅞	133.6	39.27	4.11	549	548	531	515	499	483	467	451	435	419	403	387	371	355	339	323	307	291	275
	1	139.5	41.02	4.11	574	572	555	538	521	504	488	471	454	437	421	404	387	370	354	337	320	303	287

Maximum unit stress = 14,000 pounds per square inch.

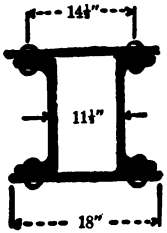
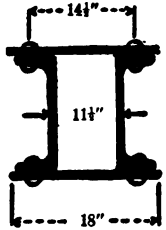


PLATE AND CHANNEL COLUMNS

SAFE LOADS IN THOUSANDS OF POUNDS

15 INCH CHANNELS



Allowable unit stress = 16,000 − 70 $\frac{l}{r}$

l = unsupported length of column in inches

r = corresponding radius of gyration in inches

To left of heavy line $\frac{l}{r} < 125$ **To right of heavy line $\frac{l}{r} < 150$**

Weight of each Channel	Thickness of Plates	Weight of Column	Area of Column Section	Least Radius of Gyration	Length in Feet																				
Pounds per Foot	Inch	Pounds per Foot	Square Inches	Inches	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
33	⅜	111.9	33.30	5.83	466	465	455	445	436	426	416	407	397	388	378	369	359	349	340	330	321	311	302	292	283
	7/16	119.5	35.55	5.79	497	496	485	475	465	454	444	434	423	413	403	392	382	372	361	351	341	330	320	310	300
	½	127.2	37.80	5.76	529	527	515	504	494	483	472	461	450	439	428	417	406	395	384	373	362	351	340	329	319
	9/16	134.8	40.06	5.73	560	558	546	534	522	510	499	487	475	464	452	440	428	417	405	393	381	370	358	346	335
	⅝	142.4	42.30	5.70	592	589	576	563	551	539	526	514	501	489	476	464	451	439	426	414	401	389	376	364	352
	11/16	150.0	44.56	5.68	623	620	606	593	580	567	554	540	527	514	501	488	475	462	448	435	422	409	396	383	370
	¾	157.8	46.80	5.65	655	651	637	623	609	595	581	567	553	539	525	511	497	483	469	455	441	427	413	399	386
35	⅜	115.9	34.08	5.80	477	476	466	456	446	436	426	416	406	396	386	377	367	357	347	337	327	317	307	297	288
	7/16	123.5	36.33	5.76	508	507	496	485	475	464	453	443	432	421	411	400	390	379	368	358	347	336	326	315	305
	½	131.2	38.58	5.73	540	538	526	515	503	492	481	470	458	447	436	424	413	402	390	379	368	356	345	334	323
	9/16	138.8	40.84	5.70	571	569	556	544	532	520	508	496	484	472	460	448	436	424	412	400	388	376	364	352	340
	⅝	146.8	43.08	5.68	603	600	587	574	561	548	536	523	510	497	484	472	459	446	433	420	408	395	382	369	357
	11/16	154.0	45.34	5.65	634	631	617	603	590	576	563	549	536	522	509	495	482	468	455	441	428	414	401	387	374
	¾	161.8	47.58	5.63	666	661	646	632	618	604	590	576	561	547	533	519	505	491	477	462	448	434	420	406	392

Channel	Plates	Column	Section	Gyration																				
Pounds per Foot	Inch	Pounds per Foot	Square Inches	Inches	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
40	3/8	125.9	37.02	5.78	518	517	505	494	483	472	461	450	439	428	417	405	394	383	372	361	350	339	328	317	306
	7/16	133.5	39.27	5.75	549	548	536	525	513	502	490	479	467	456	444	433	421	410	398	387	375	364	352	341	330
	1/2	141.2	41.52	5.72	581	578	565	553	541	529	517	504	492	480	468	456	444	432	419	407	395	383	371	359	347
	9/16	148.8	43.78	5.69	612	610	596	583	571	558	545	532	519	506	493	480	467	454	441	428	415	402	389	376	364
	5/8	156.4	46.02	5.67	644	640	626	612	599	585	571	558	544	530	517	503	490	476	462	449	435	421	408	394	381
	11/16	164.0	48.28	5.65	675	672	657	643	628	614	600	585	571	556	542	528	513	499	485	470	456	442	427	413	399
	3/4	171.8	50.52	5.63	707	702	686	671	656	641	626	611	596	581	566	551	536	521	506	491	476	461	446	431	416
45	3/8	135.9	39.98	5.72	559	557	545	533	521	509	498	486	474	463	451	439	427	416	404	392	380	369	357	345	334
	7/16	143.5	42.23	5.69	591	588	575	563	550	538	525	513	500	488	475	463	450	438	425	413	400	388	375	363	351
	1/2	151.2	44.48	5.67	622	619	605	592	579	566	553	539	526	513	500	487	474	461	447	434	421	408	395	382	369
	9/16	158.8	46.74	5.65	654	650	636	622	608	594	580	566	552	538	524	511	497	483	469	455	441	427	413	399	385
	5/8	166.4	48.98	5.63	685	681	666	651	637	622	607	593	578	563	549	534	520	505	490	476	461	446	432	417	403
	11/16	174.0	51.24	5.61	717	712	696	681	665	650	635	619	604	588	573	558	542	527	512	496	481	466	450	435	420
	3/4	181.8	53.48	5.59	748	743	726	710	694	678	662	646	630	614	598	581	565	549	533	517	501	485	469	453	437
50	3/8	145.9	42.92	5.70	600	598	585	572	559	547	534	521	509	496	483	471	458	445	433	420	407	395	382	369	357
	7/16	153.5	45.17	5.68	638	629	615	602	588	575	562	548	535	522	508	495	481	468	455	441	428	415	401	388	375
	1/2	161.2	47.42	5.66	663	660	645	631	614	603	589	575	561	547	533	518	504	490	476	462	448	434	420	406	392
	9/16	168.8	49.68	5.64	695	691	676	661	646	631	617	602	587	572	557	543	528	513	498	483	469	454	439	424	410
	5/8	176.4	51.92	5.62	726	722	706	690	675	659	644	628	613	597	582	566	551	535	520	504	489	473	458	442	427
	11/16	184.0	54.18	5.60	758	753	736	720	704	687	671	655	639	622	606	590	574	557	541	525	509	492	476	460	444
	3/4	191.8	56.42	5.59	789	784	767	750	733	716	699	682	665	648	631	614	597	580	563	546	529	512	495	478	461
55	3/8	155.9	45.86	5.64	642	638	624	611	597	583	570	556	542	529	515	501	481	474	460	446	433	419	405	392	378
	7/16	163.5	48.11	5.62	673	669	655	642	627	612	597	583	568	553	540	525	510	496	482	467	452	438	423	409	395
	1/2	171.2	50.36	5.60	705	700	685	670	655	640	625	610	594	578	563	548	533	517	502	487	472	457	442	427	412
	9/16	178.8	52.62	5.59	736	731	715	700	684	668	652	637	621	605	589	573	557	541	525	509	493	478	462	446	430
	5/8	186.4	54.86	5.57	768	761	744	728	711	695	678	662	645	628	612	595	578	562	546	529	512	496	480	463	447
	11/16	194.0	57.12	5.56	799	793	776	760	742	725	707	690	673	655	639	622	604	587	569	552	535	517	500	482	465
	3/4	201.8	59.36	5.54	831	823	805	787	769	752	734	716	698	679	661	643	625	607	589	561	553	535	517	499	481

Maximum unit stress = 14,000 pounds per square inch.

ed below.

B 67

I BEAM COLUMNS

SAFE LOADS IN THOUSANDS OF POUNDS

Allowable unit stress $= 16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = least radius of gyration in inches

To left of heavy lines $\frac{l}{r} < 125$ To right of heavy lines $\frac{l}{r} < 150$

Depth of Beam, Inches	Weight per Foot of Length	Area of Section	Least r	Unsupported Length of Column in Feet											
				2	3	4	5	6	7	8	9	10	11	12	13
3	5.5	1.63	.53	20.9	18.3	15.7	13.1	10.6	.....	.....	.....	.....	.....	.....	.....
	6.5	1.91	.52	24.4	21.3	18.2	15.1	12.1	.....	.....	.....	.....	.....	.....	.....
	7.5	2.21	.52	28.2	24.6	21.0	17.4	13.9	.....	.....	.....	.....	.....	.....	.....
4	7.5	2.21	.59	29.1	25.9	22.7	19.5	16.3	13.3	.....	.....	.....	.....	.....	.....
	8.5	2.50	.58	32.8	29.2	25.6	22.0	18.4	14.6	.....	.....	.....	.....	.....	.....
	9.5	2.79	.58	36.6	32.5	28.4	24.3	20.2	16.3	.....	.....	.....	.....	.....	.....
	10.5	3.09	.57	40.3	35.8	31.3	26.8	22.3	17.6	.....	.....	.....	.....	.....	.....
5	9.75	2.87	.65	38.5	34.8	31.1	27.4	23.7	20.0	16.2	.....	.....	.....	.....	.....
	12.25	3.60	.63	48.0	43.2	38.4	33.6	28.8	24.0	.....	.....	.....	.....	.....	.....
	14.75	4.34	.63	57.8	52.0	46.2	40.4	34.6	28.9	.....	.....	.....	.....	.....	.....

Depth of Beam, Inches	Weight per Foot of Length	Area of Section	Least r	Unsupported Length in Feet											
				2	3	4	5	6	7	8	9	10	11	12	13
6	12.25	3.61	.72	49.3	45.1	40.9	36.7	32.5	28.3	24.1	19.9	.....	.....	.....	.....
	14.75	4.34	.69	58.8	53.5	48.2	42.9	37.6	32.3	27.1	.....	.....	.....	.....	.....
	17.25	5.07	.68	68.6	62.3	56.0	49.7	43.4	37.1	31.0	.....	.....	.....	.....	.....
7	15.0	4.42	.78	61.2	56.4	51.6	46.8	42.0	37.2	32.4	27.9	.....	.....	.....	.....
	17.5	5.15	.76	71.0	65.3	59.6	53.9	48.2	42.5	36.8	31.2	.....	.....	.....	.....
	20.0	5.88	.74	80.8	74.1	67.4	60.7	54.0	47.3	40.6	34.0	.....	.....	.....	.....
8	18.0	5.33	.84	74.6	69.3	64.0	58.7	53.4	48.1	42.8	37.5	32.0	.....	.....	.....
	20.25	5.96	.82	83.1	77.0	70.9	64.8	58.7	52.6	46.5	40.4	34.3	.....	.....	.....
	22.75	6.69	.81	93.0	86.1	79.2	72.3	65.4	58.5	51.6	44.7	37.6	.....	.....	.....
	25.25	7.43	.80	103.2	95.4	87.6	79.8	72.0	64.2	56.4	48.6	40.9	.....	.....	.....
9	21.0	6.31	.90	89.1	83.2	77.3	71.4	65.5	59.6	53.7	47.8	41.9	36.2	.....	.....
	25.0	7.35	.88	103.4	96.4	89.4	82.4	75.4	68.4	61.4	54.4	47.4	40.5	.....	.....
	30.0	8.82	.85	123.9	115.2	106.5	97.8	89.1	80.4	71.7	63.0	54.0	.....	.....	.....
	35.0	10.29	.84	144.0	133.7	123.4	113.1	102.8	92.5	82.2	71.9	61.6	.....	.....	.....
10	25.0	7.37	.97	105.0	98.6	92.2	85.8	79.4	73.0	66.6	60.2	53.8	47.4	41.3	.....
	30.0	8.82	.93	125.0	117.1	109.2	101.3	93.4	85.5	77.6	69.7	61.8	53.6	.....	.....
	35.0	10.20	.91	144.3	134.9	125.5	116.1	106.7	97.3	87.9	78.5	69.1	59.6	.....	.....
	40.0	11.76	.90	166.1	155.1	144.1	133.1	122.1	111.1	100.1	89.1	78.1	67.3	.....	.....
12	31.5	9.26	1.01	132.8	125.1	117.4	109.7	102.0	94.3	86.6	78.9	71.2	63.5	55.5	.....
	35.0	10.29	.99	147.0	138.3	129.6	120.9	112.2	103.5	94.8	86.1	77.4	68.7	59.6	.....
	40.0	11.76	.96	167.5	157.2	146.9	136.6	126.3	116.0	105.7	95.4	85.1	74.8	64.6	.....
	40.0	11.84	1.08	171.0	161.8	152.6	143.4	134.2	125.0	115.8	106.6	97.4	88.2	79.0	69.8
	45.0	13.24	1.06	191.0	180.5	170.0	159.5	149.0	138.5	128.0	117.5	107.0	96.5	86.0	75.4
	50.0	14.71	1.05	212.0	200.2	188.4	176.6	164.8	153.0	141.2	129.4	117.6	105.8	94.0	82.5

B 67
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I BEAM COLUMNS

SAFE LOADS IN THOUSANDS OF POUNDS

Allowable unit stress $= 16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches

r = least radius of gyration in inches

To left of heavy lines $\frac{l}{r} < 125$ To right of heavy lines $\frac{l}{r} < 150$

Depth of Beam, Inches	Weight per Foot of Length	Area of Section	Least r	Unsupported Length of Column in Feet											
				6	7	8	9	10	11	12	13	14	15	16	17
12	55.0	16.18	1.04	179.8	166.7	153.6	140.5	127.4	114.3	101.2	88.8	.....	.....	.....	.....
15	42.0	12.48	1.08	141.4	131.7	122.0	112.3	103.6	92.9	83.2	73.5	.....	.....	.....	.....
	45.0	13.24	1.07	149.3	138.9	128.5	118.1	107.7	97.3	86.9	76.6	.....	.....	.....	.....
	50.0	14.71	1.04	164.0	152.1	140.2	128.3	116.4	104.5	92.6	80.8	.....	.....	.....	.....
	55.0	16.18	1.03	179.6	166.4	153.2	140.0	126.8	113.6	100.5	.....	.....	.....	.....	.....
	60.0	17.65	1.01	194.2	179.6	165.0	150.4	135.8	121.2	106.7	.....	.....	.....	.....	.....
	60.0	17.67	1.21	209.1	196.8	184.5	172.2	159.9	147.6	135.3	123.0	110.7	98.6	.....	.....
	65.0	19.12	1.20	225.4	212.0	198.6	185.2	171.8	158.4	145.0	131.6	118.2	.....	.....	.....
	70.0	20.59	1.19	242.3	227.7	213.1	198.5	183.9	169.3	154.7	140.1	125.8	.....	.....	.....
	75.0	22.06	1.18	258.9	243.2	227.5	211.8	196.1	180.4	164.7	149.0	133.3	.....	.....	.....

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Depth of Beam, Inches	Weight per Foot of Length	Area of Section	Least r	Safe Load in Thousands of Pounds for Unsupported Length in Feet of											
				6	7	8	9	10	11	12	13	14	15	16	17
15	80.0	23.53	1.17	274.7	257.9	241.1	224.3	207.5	190.7	173.9	157.1	140.1	.....	.....	.....
	80.0	23.57	1.32	287.0	272.0	257.0	242.0	227.0	212.0	197.0	182.0	167.0	152.0	137.0	.....
	85.0	25.00	1.32	304.4	288.5	272.6	256.7	240.8	224.9	209.0	193.1	177.2	161.3	145.3	.....
	90.0	26.47	1.32	322.5	305.7	288.8	272.0	255.1	238.3	221.4	204.6	187.7	170.9	154.0	.....
	95.0	27.94	1.31	339.5	321.5	303.5	285.5	267.5	249.5	231.5	213.5	177.5	177.5	160.0	.....
	100.0	29.41	1.31	357.7	338.8	319.9	301.0	282.1	263.2	244.3	225.4	206.5	187.6	168.6	.....
18	55.0	15.93	1.15	185.1	173.5	161.9	150.3	138.7	127.1	115.5	103.9	92.3	.....	.....	.....
	60.0	17.65	1.13	203.7	190.6	177.4	164.3	151.1	138.0	124.8	111.7	98.5	.....	.....	.....
	65.0	19.12	1.11	219.0	204.5	190.0	175.5	161.0	146.5	132.0	117.8	.....	.....	.....	.....
	70.0	20.59	1.09	234.4	218.6	202.8	187.0	171.2	155.4	139.6	123.6	.....	.....	.....	.....
20	65.0	19.06	1.21	225.6	212.4	199.2	186.0	172.8	159.6	146.4	133.2	120.0	106.8	.....	.....
	70.0	20.59	1.19	242.0	227.5	213.0	198.5	184.0	169.5	155.0	140.5	126.0	.....	.....	.....
	75.0	22.06	1.17	258.2	242.3	226.4	210.5	194.6	178.7	162.8	146.9	131.4	.....	.....	.....
	80.0	23.73	1.39	293.3	279.0	264.6	250.3	235.9	221.6	207.2	192.9	178.5	164.2	149.8	135.5
	85.0	25.00	1.37	308.3	293.0	277.6	262.3	246.9	231.6	216.2	200.9	185.5	170.3	154.9	139.6
	90.0	26.47	1.36	325.5	309.1	292.8	276.4	260.1	243.7	227.4	211.0	194.7	178.4	162.1	145.8
	95.0	27.94	1.35	342.7	325.3	307.9	290.5	273.1	255.7	238.3	220.9	203.5	186.1	169.0	.....
	100.0	29.41	1.34	359.5	341.1	322.7	304.3	285.9	267.5	249.1	230.7	212.3	193.9	175.7	.....
24	80.0	23.32	1.36	286.9	272.5	258.1	243.7	229.3	214.9	200.5	186.1	171.7	157.3	142.9	128.3
	85.0	25.00	1.33	305.2	289.4	273.6	257.8	242.0	226.2	210.4	194.6	178.8	163.0	147.5	.....
	90.0	26.47	1.31	322.0	305.0	288.0	271.0	254.0	237.0	220.0	203.0	186.0	169.0	152.0	.....
	95.0	27.94	1.30	338.8	320.7	302.6	284.5	266.4	248.3	230.2	212.1	194.0	175.9	157.8	.....
	100.0	29.41	1.28	354.8	335.5	316.2	296.9	277.6	258.3	239.0	219.7	200.4	181.1	162.0	.....

SINGLE ANGLE COLUMNS OR STRUTS

SAFE LOADS IN THOUSANDS OF POUNDS

EQUAL LEG ANGLES

Allowable unit stress $= 16000 - 70\frac{l}{r}$

l = effective length of member in inches

r = corresponding radius of gyration in inches

To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Size of Angle, Inches	Length in Feet											
	3	4	5	6	7	8	9	10	11	12	13	14
1½×1½×$\frac{1}{8}$	4	....	....	....	....	....	....	....	....	....	....	....
1¾×1¾×$\frac{1}{8}$	5	4	....	....	....	....	....	....	....	....	....	....
$\frac{1}{4}$	7	5	....	....	....	....	....	....	....	....	....	....
2 ×2 ×$\frac{1}{8}$	7	5	4	....	....	....	....	....	....	....	....	....
$\frac{1}{4}$	9	7	....	....	....	....	....	....	....	....	....	....
$\frac{3}{8}$	11	8	....	....	....	....	....	....	....	....	....	....
2½×2½×$\frac{1}{8}$	10	8	7	5	....	....	....	....	....	....	....	....
$\frac{1}{4}$	13	11	9	7	....	....	....	....	....	....	....	....
$\frac{3}{8}$	16	13	11	8	....	....	....	....	....	....	....	....
3 ×3 ×$\frac{1}{4}$	17	15	13	11	9	....	....	....	....	....	....	....
$\frac{5}{16}$	21	18	16	13	11	....	....	....	....	....	....	....
$\frac{3}{8}$	25	22	18	15	12	....	....	....	....	....	....	....
$\frac{7}{16}$	28	25	21	18	14	....	....	....	....	....	....	....
3½×3½×$\frac{5}{16}$	26	23	21	18	16	13	....	....	....	....	....	....
$\frac{3}{8}$	31	28	25	22	19	16	....	....	....	....	....	....
$\frac{7}{16}$	35	32	28	25	21	18	....	....	....	....	....	....
4 ×4 ×$\frac{5}{16}$	31	28	26	23	21	18	15	....	....	....	....	....
$\frac{3}{8}$	37	34	31	27	24	21	18	....	....	....	....	....
$\frac{7}{16}$	42	39	35	32	28	24	21	....	....	....	....	....
$\frac{1}{2}$	48	44	40	36	32	28	24	....	....	....	....	....
5 ×5 ×$\frac{3}{8}$	49	46	42	39	36	33	30	27	24	21	....	....
$\frac{7}{16}$	56	53	49	45	42	38	35	31	27	24	....	....
$\frac{1}{2}$	64	60	56	52	47	43	39	35	31	27	....	....
$\frac{9}{16}$	71	67	62	58	53	48	44	39	35	30	....	....
6 ×6 ×$\frac{3}{8}$	60	57	54	51	48	45	42	39	36	33	30	27
$\frac{7}{16}$	70	67	63	59	56	52	49	45	42	38	34	31
$\frac{1}{2}$	80	76	72	67	63	59	55	51	47	43	39	35
$\frac{9}{16}$	89	85	80	75	71	66	62	57	53	48	43	39
$\frac{5}{8}$	98	93	89	83	78	73	68	63	58	53	48	43

SINGLE ANGLE COLUMNS OR STRUTS

SAFE LOADS IN THOUSANDS OF POUNDS

UNEQUAL LEG ANGLES

Allowable unit stress = $16000 - 70\frac{l}{r}$

l = effective length of member in inches

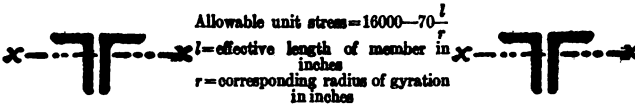
r = corresponding radius of gyration in inches

ft of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Size of Angle, Inches	Length in Feet											
	3	4	5	6	7	8	9	10	11	12	13	14
2 ×1⅜×¼	5	....	....	....	....	....	....	....	....	....	....	....
2½×2 ×¼	8	7	5	....	....	....	....	....	....	....	....	....
¼	11	8	6	....	....	....	....	....	....	....	....	....
⅜	13	10	8	....	....	....	....	....	....	....	....	....
3 ×2 ×¼	12	10	7	....	....	....	....	....	....	....	....	....
⅜	15	12	9	....	....	....	....	....	....	....	....	....
3 ×2½×¼	15	13	11	8	....	....	....	....	....	....	....	....
⅜	18	16	13	11	....	....	....	....	....	....	....	....
½	21	18	15	12	....	....	....	....	....	....	....	....
3½×2½×¼	16	14	12	10	....	....	....	....	....	....	....	....
⅜	20	17	15	12	....	....	....	....	....	....	....	....
½	24	21	17	14	....	....	....	....	....	....	....	....
3½×3 ×⅜	23	21	18	15	13	....	....	....	....	....	....	....
½	27	24	21	18	15	....	....	....	....	....	....	....
⅝	32	28	24	21	17	....	....	....	....	....	....	....
½	36	32	28	24	20	....	....	....	....	....	....	....
4 ×3 ×⅜	25	23	20	17	15	12	....	....	....	....	....	....
½	30	27	23	20	17	14	....	....	....	....	....	....
⅝	35	31	27	23	20	16	....	....	....	....	....	....
½	39	35	31	26	22	18	....	....	....	....	....	....
5 ×3½×⅜	32	30	27	24	21	18	15	....	....	....	....	....
½	39	35	32	29	25	22	18	....	....	....	....	....
⅝	45	41	37	33	29	25	21	....	....	....	....	....
½	50	46	42	37	33	28	24	....	....	....	....	....
6 ×4 ×⅜	47	44	41	37	34	30	27	23	20	....	....	....
½	55	51	47	43	39	35	31	26	....	....	....	....
⅝	62	58	53	49	44	39	35	30	....	....	....	....
¾	70	65	59	54	49	44	39	34	....	....	....	....
⅝	77	71	65	59	54	48	42	36	....	....	....	....

DOUBLE ANGLE COLUMNS OR STRUTS

SAFE LOADS IN THOUSANDS OF POUNDS



Allowable unit stress = $16000 - 70\frac{l}{r}$

l = effective length of member in inches

r = corresponding radius of gyration in inches

To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Size of Angle in Inches	Length in Feet											
	3	4	5	6	7	8	9	10	11	12	13	14
1½×1½×$\frac{5}{16}$	11	9	7	....	....	....	....	....	....	....	....	....
$\frac{1}{4}$	14	19	9	....	....	....	....	....	....	....	....	....
2 ×1½×$\frac{5}{16}$	14	13	11	10	8	....	....	....	....	....	....	....
$\frac{1}{4}$	19	17	15	12	10	....	....	....	....	....	....	....
1¾×1¾×$\frac{5}{16}$	14	12	10	8	....	....	....	....	....	....	....	....
$\frac{1}{4}$	18	16	13	11	....	....	....	....	....	....	....	....
2 ×2 ×$\frac{5}{16}$	17	15	13	11	9	....	....	....	....	....	....	....
$\frac{1}{4}$	22	20	17	15	12	....	....	....	....	....	....	....
2½×2 ×$\frac{5}{16}$	21	19	17	16	14	12	10	....	....	....	....	....
$\frac{1}{4}$	27	25	23	20	18	16	13	....	....	....	....	....
$\frac{5}{16}$	33	31	28	25	22	19	17	....	....	....	....	....
2½×2½×¼	30	28	25	22	20	17	15	....	....	....	....	....
$\frac{5}{16}$	37	34	31	28	24	21	18	....	....	....	....	....
$\frac{3}{8}$	44	40	36	32	28	24	21	....	....	....	....	....
3 ×2 ×¼	31	29	27	25	22	20	18	16	13	....	....	....
$\frac{5}{16}$	39	36	33	31	28	25	22	20	17	....	....	....
$\frac{3}{8}$	46	43	39	36	33	30	27	23	20	....	....	....
3 ×2½×¼	35	33	30	28	26	23	21	19	16	....	....	....
$\frac{5}{16}$	43	40	37	34	32	29	26	23	20	....	....	....
$\frac{3}{8}$	51	48	44	41	37	34	30	27	23	....	....	....
3 ×3 ×¼	39	36	33	30	28	25	23	20	17	....	....	....
$\frac{5}{16}$	47	44	41	37	34	31	28	24	23	....	....	....
$\frac{3}{8}$	56	52	48	44	40	36	32	29	25	....	....	....
$\frac{7}{16}$	64	60	55	51	46	42	37	33	28	....	....	....
½	73	67	62	57	52	47	42	37	32	....	....	....
3½×2½×¼	39	37	35	33	31	28	26	24	22	19	17	....
$\frac{5}{16}$	49	46	43	41	38	35	32	30	27	24	22	....
$\frac{3}{8}$	58	55	51	48	45	42	39	35	32	29	26	....
$\frac{7}{16}$	67	63	59	55	52	48	44	40	37	33	29	....
½	75	71	67	63	58	54	50	46	41	37	33	....
3½×3 ×$\frac{5}{16}$	53	50	47	44	41	38	35	32	29	26	23	....
$\frac{3}{8}$	63	59	56	52	49	45	42	38	35	31	28	....
$\frac{7}{16}$	72	68	64	60	56	52	48	44	39	35	31	....
½	82	77	72	68	63	58	54	49	44	39	35	....

DOUBLE ANGLE COLUMNS OR STRUTS

SAFE LOADS IN THOUSANDS OF POUNDS

Allowable unit stress = $16000 - 70\frac{l}{r}$

l = effective length of member in inches

r = corresponding radius of gyration in inches

t of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

f	Length in Feet																				
s	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
5/16	59	56	53	50	48	45	42	39	37	34	31	28	25	...	...	...	...	...	...	...	...
3/8	69	66	63	59	58	53	50	46	43	40	36	33	30	...	...	...	...	...	...	...	...
7/16	80	76	73	69	65	61	57	53	49	46	42	38	34	...	...	...	...	...	...	...	...
1/2	91	87	82	78	73	69	65	60	56	52	47	43	38	...	...	...	...	...	...	...	...
9/16	101	96	91	86	82	77	72	67	62	57	52	47	42	...	...	...	...	...	...	...	...
5/8	111	106	100	95	89	84	78	73	68	62	57	51	46	...	...	...	...	...	...	...	...
5/16	67	64	60	57	54	50	47	44	40	37	34	31	27	...	...	...	...	...	...	...	...
3/8	80	76	72	68	64	60	56	52	49	45	41	37	33	...	...	...	...	...	...	...	...
7/16	92	88	83	79	75	70	66	61	57	52	48	43	39	...	...	...	...	...	...	...	...
1/2	105	100	95	90	85	80	75	70	65	60	54	49	44	...	...	...	...	...	...	...	...
9/16	117	111	106	100	95	89	84	78	72	67	61	56	50	...	...	...	...	...	...	...	...
5/8	129	123	117	111	105	99	93	87	81	75	69	63	57	51	...	...	...	...	...	...	...
5/16	73	70	67	64	61	58	55	52	49	46	43	40	37	34	31	28	...	...	...	...	...
3/8	87	84	80	77	73	70	66	62	59	55	52	48	45	41	38	34	...	...	...	...	...
7/16	101	97	93	89	85	81	77	73	69	65	61	57	53	48	44	40	...	...	...	...	...
1/2	114	110	105	101	96	92	87	83	78	74	69	65	60	56	51	47	...	...	...	...	...
9/16	128	123	118	113	108	103	98	93	88	83	78	73	68	63	58	53	...	...	...	...	...
5/8	141	136	130	125	119	114	108	103	97	92	86	81	75	70	64	59	...	...	...	...	...
11/16	154	148	142	136	130	124	118	113	107	101	95	89	83	77	71	65	59	...	...	...	...
3/4	167	160	154	148	140	135	128	122	116	109	103	97	90	84	77	71	65	...	...	...	...
3/8	97	83	89	85	81	76	72	68	64	60	56	52	47	43	39	...	...	...	...	...	...
7/16	113	108	103	98	94	89	84	79	74	70	65	60	54	51	46	...	...	...	...	...	...
1/2	128	123	117	112	106	101	96	90	85	80	74	69	64	58	53	...	...	...	...	...	...
9/16	143	137	131	125	119	113	107	102	96	90	84	78	72	66	60	...	...	...	...	...	...
5/8	158	152	145	138	132	125	119	112	106	99	93	86	80	73	67	...	...	...	...	...	...
11/16	173	166	159	152	145	138	131	124	117	110	103	96	89	82	75	68	...	...	...	...	...
3/4	187	180	172	165	157	150	142	135	127	119	112	104	97	89	82	74	...	...	...	...	...
7/16	104	101	97	93	89	86	82	78	74	71	67	63	59	56	52	48	45	41	...	...	...
1/2	121	117	112	108	104	99	95	91	86	82	78	74	69	65	61	56	52	48	...	...	...
9/16	138	133	128	123	118	113	109	104	99	94	89	84	79	75	70	65	60	55	...	...	...
5/8	154	148	143	138	132	127	122	116	111	105	100	95	89	84	79	73	68	62	...	...	...
11/16	170	164	158	152	146	140	134	129	123	117	111	105	99	93	87	81	76	70	...	...	...
3/4	186	179	173	167	160	154	147	141	135	128	122	115	109	103	96	90	83	77	71	...	...
13/16	202	195	188	181	174	167	160	153	147	140	133	126	119	112	105	99	92	85	78	...	...
7/16	128	124	120	116	112	108	105	101	97	93	89	85	81	77	73	69	66	62	58	54	50
1/2	148	144	139	135	130	126	121	117	112	107	103	98	94	89	85	80	75	71	67	62	57
9/16	168	163	158	153	148	142	137	132	127	122	117	111	106	101	96	91	85	80	75	70	65
5/8	188	182	177	171	165	159	153	147	142	136	130	124	118	112	106	101	95	89	83	77	71
11/16	208	202	195	189	182	176	169	163	156	150	143	137	130	124	117	111	104	98	91	85	78
3/4	228	220	213	206	199	192	185	178	170	163	156	149	142	135	128	120	113	106	99	92	...
13/16	247	239	231	224	216	208	200	193	185	177	169	162	154	146	138	131	123	115	117	100	...

DOUBLE ANGLE COLUMNS OR STRUTS

SAFE LOADS IN THOUSANDS OF POUNDS

Allowable unit stress = $16000 - 70\frac{l}{r}$

l = effective length of member in inches

r = corresponding radius of gyration in inches

To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Size of Angle, Inches	Length in Feet											
	3	4	5	6	7	8	9	10	11	12	13	14
2 ×2 ×$\frac{3}{16}$	17	15	13	11	9	....	....	....	....	....	....	....
$\frac{1}{4}$	22	20	17	15	12	....	....	....	....	....	....	....
2½×2 ×$\frac{3}{16}$	19	17	15	12	10	....	....	....	....	....	....	....
$\frac{1}{4}$	25	22	19	16	13	....	....	....	....	....	....	....
$\frac{5}{16}$	31	27	23	19	15	....	....	....	....	....	....	....
2½×2½×¼	30	28	25	22	20	17	15	....	....	....	....	....
$\frac{5}{16}$	37	34	31	28	24	21	18	....	....	....	....	....
3 ×2 ×¼	28	24	21	17	14	....	....	....	....	....	....	....
$\frac{5}{16}$	34	30	25	21	17	....	....	....	....	....	....	....
⅜	40	35	29	24	19	....	....	....	....	....	....	....
3 ×2½×¼	33	30	27	24	21	18	16	....	....	....	....	....
$\frac{5}{16}$	41	37	33	30	26	22	19	....	....	....	....	....
⅜	48	44	40	35	31	27	22	....	....	....	....	....
3 ×3 ×¼	38	36	33	30	28	25	22	20	17	....	....	....
$\frac{5}{16}$	47	44	41	37	34	31	28	24	21	....	....	....
⅜	56	52	48	44	40	36	32	29	25	....	....	....
$\frac{7}{16}$	64	60	55	50	46	42	37	33	28	....	....	....
½	73	67	62	57	52	47	42	37	32	....	....	....
3½×2½×¼	36	33	30	26	23	20	17	....	....	....	....	....
$\frac{5}{16}$	45	41	36	32	28	24	20	....	....	....	....	....
⅜	53	48	43	38	33	28	23	....	....	....	....	....
$\frac{7}{16}$	61	55	49	43	38	32	....	....	....	....	....	....
½	68	62	55	48	42	35	....	....	....	....	....	....
3½×3 ×$\frac{5}{16}$	51	47	44	40	37	33	29	26	22	....	....	....
⅜	61	56	52	48	44	39	35	31	26	....	....	....
$\frac{7}{16}$	70	65	60	55	50	45	40	35	30	....	....	....
½	79	73	67	62	56	50	44	39	33	....	....	....
3½×3½×$\frac{5}{16}$	57	54	51	47	44	41	38	35	31	28	25	....
⅜	68	64	60	56	52	48	44	40	37	33	29	....
$\frac{7}{16}$	78	74	69	65	60	56	51	47	42	38	33	....
½	89	83	78	73	68	63	58	53	47	42	37	....

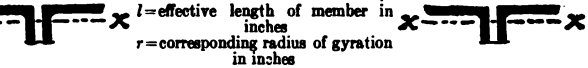
DOUBLE ANGLE COLUMNS OR STRUTS

SAFE LOADS IN THOUSANDS OF POUNDS

Allowable unit stress = $16000 - 70\frac{l}{r}$

l = effective length of member in inches

r = corresponding radius of gyration in inches



t of heavy line $\frac{l}{r} < 125$ To right or heavy line $\frac{l}{r} < 150$

f Angles, ches	Length in Feet																
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
×⅛	55	51	47	43	39	35	31	27	23	...	...	...	...	...	...	...	...
⅜	65	60	56	51	46	41	37	22	27	...	...	...	...	...	...	...	...
⅛	75	70	64	59	53	48	42	36	...	...	...	...	...	...	...	...	...
½	85	79	72	66	60	53	47	40	...	...	...	...	...	...	...	...	...
⅝	95	88	81	73	66	59	52	45	...	...	...	...	...	...	...	...	...
⅛	104	96	88	80	72	64	57	49	...	...	...	...	...	...	...	...	...
×⅛	67	64	61	57	54	51	48	44	41	38	35	31	28	...	...	...	...
⅜	80	76	72	68	64	60	56	53	49	45	41	37	33	...	...	...	...
⅛	92	88	83	79	74	70	65	61	56	52	47	43	38	...	...	...	...
½	105	99	94	89	84	79	74	68	63	58	53	48	43	...	...	...	...
×⅛	63	58	53	48	44	39	34	29	...	...	...	...	...	...	...	...	...
⅜	74	69	63	57	51	46	40	34	...	...	...	...	...	...	...	...	...
½	86	79	73	66	60	53	46	40	...	...	...	...	...	...	...	...	...
⅛	97	90	82	74	67	59	52	44	...	...	...	...	...	...	...	...	...
½×⅛	69	65	61	57	53	48	44	40	36	32	...	...	...	...	...	...	...
⅜	83	78	73	68	62	57	52	47	42	37	...	...	...	...	...	...	...
⅛	95	89	84	78	72	66	60	54	48	43	...	...	...	...	...	...	...
½	108	101	95	88	81	75	68	61	55	48	...	...	...	...	...	...	...
⅛	121	113	105	98	90	83	75	68	60	53	...	...	...	...	...	...	...
⅝	132	124	116	107	99	91	82	74	66	57	...	...	...	...	...	...	...
⅛	144	136	126	117	107	98	89	80	71	61	...	...	...	...	...	...	...
¾	156	146	136	126	116	105	96	86	76	66	...	...	...	...	...	...	...
×⅜	104	100	96	92	88	84	81	77	73	69	65	61	57	53	49	46	42
⅛	120	116	111	107	102	98	93	88	84	79	75	70	66	61	57	52	48
½	136	131	126	121	116	111	105	100	95	90	85	79	74	69	64	59	54
½×⅜	92	86	80	75	69	63	57	51	46	40	...	...	...	...	...	...	...
⅛	107	100	93	86	79	73	66	59	52	45	...	...	...	...	...	...	...
½	121	113	105	97	89	82	74	66	58	51	...	...	...	...	...	...	...
⅛	148	139	129	119	110	100	90	80	71	61	...	...	...	...	...	...	...
×⅜	100	95	90	84	79	74	69	64	59	53	48	43	...	...	...	...	...
⅛	116	110	104	97	91	85	79	73	67	61	55	49	...	...	...	...	...
½	131	124	117	110	103	96	90	83	76	69	62	55	...	...	...	...	...
⅛	147	139	131	123	115	107	100	92	84	76	68	60	...	...	...	...	...
⅝	161	153	144	135	127	118	109	100	92	83	74	66	...	...	...	...	...

DOUBLE ANGLE COLUMNS OR STRUTS

SAFE LOADS IN THOUSANDS OF POUNDS

To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Size of Angle, Inches		Length in Feet																												
		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	26	28	30	32	34	36
2	X2	16	14	13	12	11	9	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		21	19	16	14	13	13	13	12	11	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2½	X2	19	18	17	16	15	14	13	12	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		25	24	23	21	20	18	17	15	14	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		32	30	28	26	25	23	21	19	18	16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2½	X2½	28	26	25	23	21	20	18	16	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		35	33	31	29	26	24	22	20	18	16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	X3	30	29	27	26	25	24	22	21	20	18	17	16	14	...	...	...	...	...	...	...	...	...	...	...	...
		37	36	34	33	31	29	28	26	25	23	21	20	18	17	...	...	...	...	...	...	...	...	...	...	...
		44	42	40	38	37	35	33	31	29	27	25	23	22	20	...	...	...	...	...	...	...	...	...	...	...
3	X2½	33	31	30	28	27	25	24	22	21	19	18	16	15	...	...	...	...	...	...	...	...	...	...	...	...
		41	39	37	35	33	31	29	28	26	24	22	20	18	...	...	...	...	...	...	...	...	...	...	...	...
		48	46	44	42	40	37	35	33	31	29	27	24	22	...	...	...	...	...	...	...	...	...	...	...	...
3	X3	36	34	32	30	29	27	25	23	22	20	18	17	...	...	...	...	...	...	...	...	...	...	...	...	...
		44	42	40	38	36	33	31	29	27	25	23	21	...	...	...	...	...	...	...	...	...	...	...	...	...
		52	50	47	45	42	40	37	35	32	30	27	25	...	...	...	...	...	...	...	...	...	...	...	...	...
		61	58	55	52	49	46	43	40	38	35	32	29	...	...	...	...	...	...	...	...	...	...	...	...	...
		69	66	62	59	56	53	49	46	43	40	37	33	30	...	...	...	...	...	...	...	...	...	...	...	...
3½	X3½	38	36	35	33	32	31	29	28	26	25	23	22	21	19	18	16	...	...	...	...	...	...	...	...	...
		47	45	43	41	40	38	36	34	33	31	29	28	26	24	22	21	...	...	...	...	...	...	...	...	...
		55	53	51	49	47	45	43	41	39	37	35	33	31	29	27	25	27	...	...	...	...	...	...	...	...
		64	62	59	57	55	52	50	48	46	43	41	39	36	34	31	29	31	...	...	...	...	...	...	...	...
		72	70	67	65	62	59	57	54	51	49	46	44	41	38	36	33	...	...	...	...	...	...	...	...	...
3½	X3	50	48	46	44	42	40	38	36	34	32	30	28	27	25	23	...	...	...	...	...	...	...	...	...	...
		57	55	53	50	48	46	44	41	39	37	34	32	30	27	25	...	...	...	...	...	...	...	...	...	...
		66	64	61	58	56	53	50	48	45	42	40	37	34	32	30	29	...	...	...	...	...	...	...	...	...
		75	72	69	66	63	60	58	54	52	49	46	43	40	37	34	...	...	...	...	...	...	...	...	...	...
3½	X3½	54	52	49	47	45	43	41	38	36	34	32	30	27	25	23	...	...	...	...	...	...	...	...	...	...
		64	61	59	56	53	51	48	46	43	41	38	35	33	30	28	...	...	...	...	...	...	...	...	...	...
		74	71	68	65	62	59	56	53	50	47	45	42	39	36	33	...	...	...	...	...	...	...	...	...	...
		84	81	77	74	71	67	64	61	57	54	51	47	44	40	37	...	...	...	...	...	...	...	...	...	...

DOUBLE ANGLE COLUMNS OR STRUTS

SAFE LOADS IN THOUSANDS OF POUNDS

To left of heavy line $\frac{l}{r} < 125$ — To right of heavy line $\frac{l}{r} < 150$

| 4 | | |

BETHLEHEM H COLUMNS

SAFE LOADS IN THOUSANDS OF POUNDS

8 INCH COLUMNS

Allowable unit stress $= 16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches. r = least radius of gyration in inches.

To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Weight per Lineal Foot	Area	Least Radius of Gyration	Unsupported Length of Column in Feet														
			8	9	10	11	12	13	14	15	16	17	18	20	22	24	26
32.0	9.17	1.98	115.5	111.5	107.5	103.6	99.5	96.6	92.6	88.7	84.7	80.8	76.1	68.2	61.0	52.8	.....
34.5	10.17	2.01	128.8	124.5	120.2	115.9	111.7	107.4	103.1	98.9	94.6	90.3	86.0	78.5	70.0	61.4	.....
39.0	11.50	2.03	146.2	141.4	136.6	131.8	127.0	122.2	117.4	112.6	107.8	103.0	98.2	88.7	79.2	70.0	.....
43.5	12.83	2.04	163.0	157.7	152.4	147.1	141.8	136.5	131.2	125.9	120.6	115.3	110.0	99.4	88.8	78.4	.....
48.0	14.18	2.05	180.3	174.5	168.7	162.9	157.1	151.3	145.5	139.7	133.9	128.1	122.3	110.7	99.1	87.5	.....
53.0	15.53	2.07	198.0	191.7	185.4	179.1	172.8	166.5	160.2	153.9	147.6	141.3	135.0	122.4	109.8	97.2	.....
57.5	16.90	2.08	215.8	209.0	202.2	195.4	188.6	181.8	175.0	168.2	161.4	154.6	147.8	134.1	120.4	106.7	93.0
62.0	18.27	2.09	233.6	226.3	218.9	211.6	204.2	196.9	189.5	182.2	174.8	167.5	160.1	145.4	130.7	116.0	101.4
67.0	19.66	2.11	252.0	244.2	236.4	228.6	220.8	213.0	205.2	197.4	189.6	181.8	174.0	158.3	142.6	126.9	111.0
71.5	21.05	2.12	270.0	261.7	253.4	245.1	236.8	228.5	220.2	211.9	203.6	195.3	187.0	170.3	153.6	136.9	120.2
76.5	22.46	2.13	288.2	279 4	270.5	261.7	252.8	244.0	235.1	226.3	217.4	208.6	199.7	182.0	164.3	146.6	129.3
81.0	23.78	2.14	305.8	296.5	287.2	277.9	268.6	259.3	250.0	240.7	231.4	222.1	212.8	194.1	175.4	156.7	138.0
85.5	25.20	2.16	324.8	315.0	305.2	295.4	285.6	275.8	266.0	256.2	246.4	236.6	226.8	207.2	187.6	168.0	148.6
90.5	26.64	2.17	344.0	333.7	323.4	313.1	302.8	292.5	282.2	271.9	261.6	251.3	241.0	220.4	199.8	179.2	158.8

CHICAGO—JOSEPH T. RYERSON & SON—NEW YORK

10 INCH COLUMNS

Allowable unit stress = $16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches. r = least radius of gyration in inches.

To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Weight per Lineal Foot	Area	Least Radius of Gyration	Unsupported Length of Column in Feet														
			10	11	12	13	14	15	16	18	20	22	24	26	28	30	32
49.0	14.37	2.49	181.3	176.5	171.6	166.8	161.9	157.1	152.2	142.5	132.8	123.1	113.4	103.7	94.0	84.5	.....
54.0	15.91	2.51	201.6	196.3	190.9	185.6	180.2	174.9	169.5	158.8	148.1	137.4	126.7	116.0	105.3	94.9	.....
59.5	17.57	2.53	222.7	216.9	211.1	205.3	199.5	193.7	187.9	176.2	164.5	152.8	141.1	129.4	117.7	106.1	.....
65.5	19.23	2.54	244.0	237.7	231.4	225.1	218.8	212.5	206.2	193.5	180.8	168.8	155.4	142.7	130.0	117.2	.....
71.0	20.91	2.56	266.0	259.1	252.2	245.3	238.4	231.5	224.6	210.9	197.2	183.5	169.8	156.1	142.4	128.7	115.0
77.0	22.59	2.57	287.7	280.3	272.9	265.5	258.1	250.7	243.3	228.5	213.7	198.9	184.1	169.3	154.5	139.7	125.0
82.5	24.29	2.58	309.7	301.8	293.9	286.0	278.1	270.2	262.2	246.3	230.4	214.5	198.6	182.7	166.8	150.9	135.2
88.5	25.99	2.60	331.8	323.4	315.0	306.6	298.2	289.8	281.4	264.6	247.8	231.0	214.2	197.4	180.6	163.8	147.2
94.0	27.71	2.61	354.0	345.1	336.2	327.3	318.4	309.5	300.6	282.8	265.0	247.2	229.4	211.6	193.8	176.0	158.0
99.5	29.32	2.62	374.5	365.1	355.7	346.3	336.9	327.5	318.1	299.3	280.5	261.7	242.9	224.1	205.3	186.5	168.0
105.5	31.06	2.64	398.0	388.1	378.2	368.3	358.4	348.5	338.6	318.8	299.0	279.2	259.4	239.6	219.8	200.0	180.7
111.5	32.80	2.65	420.8	410.4	400.0	389.6	379.2	368.8	358.4	337.6	316.8	296.0	275.2	254.4	233.6	212.8	192.0
117.5	34.55	2.66	443.0	432.1	421.2	410.3	399.4	388.5	377.6	355.8	334.0	312.2	290.4	268.6	246.8	225.0	203.7
123.5	36.32	2.67	466.2	454.8	443.4	432.0	420.6	409.2	397.8	374.9	352.0	329.1	306.2	283.3	260.4	237.5	214.8

BETHLEHEM H COLUMNS

SAFE LOADS IN THOUSANDS OF POUNDS

12 INCH COLUMNS

Allowable unit stress = $16{,}000 - 70\frac{l}{r}$

l = unsupported length of column in inches. r = least radius of gyration in inches.

To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Weight per Lineal Foot	Area	Least Radius of Gyration	Unsupported Length of Column in Feet														
			10	12	14	16	18	20	22	24	26	28	30	32	34	36	38
64.5	19.00	2.98	250.2	239.5	228.8	218.1	207.4	196.7	186.0	175.3	164.6	153.9	143.2	132.5	121.8	111.2	.....
71.5	20.96	3.00	276.3	264.6	252.9	241.2	229.5	217.8	206.1	194.4	182.7	171.0	159.3	147.6	135.9	124.0	.....
78.0	22.94	3.01	303.0	290.2	277.4	264.6	251.8	239.0	226.2	213.4	200.6	187.8	175.0	162.2	149.4	136.8	.....
84.5	24.92	3.03	329.5	315.7	301.9	288.1	274.3	260.5	246.7	232.9	219.1	205.3	191.5	177.7	163.9	150.2	.....
91.5	26.92	3.04	356.0	341.1	326.2	311.3	296.4	281.5	266.6	251.7	236.8	221.9	207.0	192.1	177.2	162.3	148.0
98.5	28.92	3.06	383.3	367.4	351.5	335.6	319.7	303.8	287.9	272.0	256.1	240.2	224.3	208.4	192.5	176.6	160.7
105.0	30.94	3.07	410.0	393.1	376.2	359.3	342.4	325.5	308.6	291.7	274.8	257.9	241.0	224.1	207.2	190.3	173.3
112.0	32.96	3.08	436.4	418.4	400.5	382.5	364.6	346.6	328.7	310.7	292.8	274.8	256.9	238.9	221.0	203.0	185.2
118.5	34.87	3.10	463.5	444.6	425.7	406.8	387.9	369.0	350.1	331.2	312.3	293.4	274.5	255.6	236.7	217.8	199.0
125.5	36.91	3.11	490.6	470.7	450.7	430.8	410.8	390.9	370.9	351.0	331.0	311.1	291.1	271.2	251.2	231.3	211.2
132.5	38.97	3.13	519.0	498.1	477.2	456.3	435.4	414.5	393.6	372.7	351.8	330.9	310.0	289.1	268.2	247.3	225.8
139.5	41.03	3.14	546.0	524.1	502.2	480.3	458.4	436.5	414.6	392.7	370.8	348.9	327.0	305.1	283.2	261.3	239.5
146.5	43.10	3.15	575.0	552.0	529.1	506.1	483.2	460.2	437.3	414.3	391.4	368.4	345.5	322.5	299.6	276.6	254.0
153.5	45.19	3.16	602.5	578.5	554.5	530.5	506.5	482.5	458.5	434.5	410.5	386.5	362.5	338.5	314.5	290.5	266.3
161.0	47.28	3.18	631.5	606.5	581.6	556.6	531.7	506.7	481.8	456.8	431.9	406.9	382.0	357.0	332.1	307.1	282.2

14-INCH COLUMNS

Allowable unit stress = $16{,}000 - 70\frac{l}{r}$ l = unsupported length of column in inches. r = least radius of gyration in inches.

To left of heavy line $\frac{l}{r} < 125$ To right of heavy line $\frac{l}{r} < 150$

Weight per Lineal Foot	Area	Least Radius of Gyration	Unsupported Length of Column in Feet														
			10	12	14	16	18	20	22	24	26	28	30	32	36	40	44
83.5	24.46	3.47	332.0	320.2	308.4	296.6	284.8	273.0	261.2	249.4	237.6	225.8	214.0	202.2	178.5	154.7	.....
91.0	26.76	3.49	363.2	350.3	337.5	324.6	311.8	298.9	286.1	273.2	260.4	247.5	234.7	221.8	196.1	170.4	.....
99.0	29.06	3.50	395.5	381.5	367.6	353.6	339.7	325.7	311.8	297.8	283.9	269.9	256.0	242.1	214.2	186.2	.....
106.5	31.38	3.52	427.5	412.5	397.5	382.5	367.5	352.5	337.5	322.5	307.5	292.5	277.5	262.5	232.5	202.5	172.8
114.5	33.70	3.53	459.0	443.0	427.0	411.0	395.0	379.0	363.0	347.0	331.0	315.0	299.0	283.0	250.9	218.8	186.3
122.5	36.04	3.55	491.0	474.0	457.0	440.0	423.0	406.0	389.0	372.0	355.0	338.0	321.0	304.0	270.0	236.0	202.0
130.5	38.38	3.56	523.5	505.4	487.3	469.2	451.1	433.0	414.9	396.8	378.7	360.6	342.5	324.4	288.1	251.8	215.4
138.0	40.59	3.58	555.0	536.0	517.0	498.0	479.0	460.0	441.0	422.0	403.0	384.0	365.0	346.0	307.8	269.6	231.4
146.0	42.95	3.59	585.8	565.7	545.7	525.6	505.6	485.5	465.5	445.4	425.4	405.3	385.3	365.2	325.1	285.0	244.8
154.0	45.33	3.61	619.0	597.9	576.8	555.7	534.6	513.5	492.4	471.3	450.2	429.1	408.0	386.9	344.8	302.7	260.8
162.0	47.71	3.62	652.4	630.3	608.2	586.1	564.0	541.9	519.8	497.7	475.6	453.5	431.4	409.3	365.1	320.9	276.6
170.5	50.11	3.64	685.5	662.5	639.4	616.4	593.3	570.3	547.2	524.2	501.1	478.1	455.0	432.0	385.9	339.8	293.7
178.5	52.51	3.65	719.8	695.6	671.4	647.2	623.0	598.8	574.6	550.4	526.2	502.0	477.8	453.6	405.3	357.0	309.0
186.5	54.92	3.66	752.0	726.8	701.6	676.4	651.2	626.0	600.8	575.6	550.4	525.2	500.0	474.8	424.4	374.0	324.0
195.0	57.35	3.67	786.3	760.0	733.7	707.4	681.1	654.8	628.5	602.2	575.9	549.6	523.3	497.0	444.4	391.8	339.0
203.5	59.78	3.69	820.0	792.8	765.6	738.4	711.2	684.0	656.8	629.6	602.4	575.2	548.0	520.8	466.4	412.0	358.0
211.0	62.07	3.70	852.5	824.3	796.1	767.9	739.7	711.5	683.3	655.1	626.9	598.7	570.5	542.3	485.9	429.5	373.8
219.5	64.52	3.71	885.0	855.8	826.6	797.4	768.2	739.0	709.8	680.6	651.4	622.2	593.0	563.8	505.5	447.2	389.2
227.5	66.98	3.73	920.0	889.9	859.8	829.7	799.6	769.5	739.4	709.3	679.2	649.1	619.0	588.9	528.5	468.1	408.0
236.0	69.45	3.74	954.0	922.8	891.6	860.4	829.2	798.0	766.8	735.6	704.4	673.2	642.0	610.8	548.5	486.2	424.0
244.5	71.94	3.75	989.0	956.8	924.6	892.4	860.2	828.0	795.8	763.6	731.4	699.2	667.0	634.8	570.5	506.2	442.0
253.0	74.43	3.76	1024.0	990.8	957.6	924.4	891.2	858.0	824.8	791.6	758.4	725.2	692.0	658.8	592.3	525.8	459.0
261.5	76.93	3.77	1059.0	1024.7	990.4	956.1	921.8	887.5	853.2	818.9	784.6	750.3	716.0	681.7	613.1	544.5	476.0
270.0	79.44	3.79	1094.0	1058.8	1023.6	988.4	953.2	918.0	882.8	847.6	812.4	777.2	742.0	706.8	636.4	566.0	496.0
278.5	81.97	3.80	1130.0	1093.8	1057.6	1021.4	985.2	949.0	912.8	876.6	840.4	804.2	768.0	731.8	659.3	586.8	514.0
287.5	84.50	3.81	1166.0	1128.7	1091.4	1064.1	1016.8	979.5	942.2	904.9	867.6	830.3	793.0	755.7	681.1	606.5	532.0

SAFE LOADS FOR "FIRMTREAD" STEEL FLOOR PLATES

LOAD PER SQUARE FOOT—FIBRE STRESS OF 16,000 POUNDS

Span in Feet	Thickness in Inches							
	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8
2	83	188	333	520	750	1021	1333	2080
3	37	83	148	230	333	454	593	926
4	20	47	83	130	187	255	333	520
5	13	30	53	83	120	163	213	333
6	9	20	37	57	83	113	148	233
7	.....	15	28	42	61	83	109	171
8	.....	11	20	32	47	63	83	130
9	.....	9	16	25	37	50	65.	100
10	.....	.....	13	20	30	40	53	83

SAFE LOADS CORRUGATED SHEETS

PER SHEET

SUPPORTED AT ENDS ONLY. SHEETS, 26 INCHES WIDE

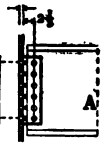
	Gauge	28	27	26	24	22	20	18	16
2½" Corrugations	6′ 0″ Span	88	97	106	141	176	211	282	352
	7′ 0″ Span	75	83	91	121	151	181	242	302
	8′ 0″ Span	66	73	79	106	132	158	211	264
	9′ 0″ Span	59	65	70	94	117	141	188	235
	10′ 0″ Span	53	58	63	85	106	127	169	211
1¼" Corrugations	6′ 0″ Span	53	58	64	85	106	127	169	211
	7′ 0″ Span	45	50	55	73	91	109	145	181
	8′ 0″ Span	40	44	47	64	79	95	127	158
	9′ 0″ Span	35	39	42	56	70	85	113	141
	10′ 0″ Span	32	34	38	51	64	76	101	127

⅝ inch is taken as depth of 2½ inch corrugations, ⅜ inch as depth of 1¼ inch corrugations.

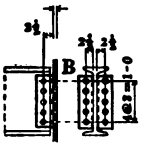
The following formula has been used: $W = \frac{99900\ t\ b\ d}{L}$

L = Supported length of sheet in inches.
t = Thickness of sheet in inches.
b = Width of sheet in inches.
d = Depth of corrugations in inches.
W = Breaking weight distributed in pounds.
$\frac{W}{4}$ = Safe loads per sheet between supports.

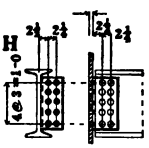
TANDARD CONNECTIONS FOR STANDARD BEAMS AND CHANNELS



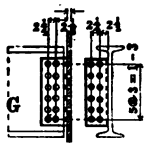
Angle Conn.
24" Beams



Double Angle Conn.
for 18" and 20" Beams

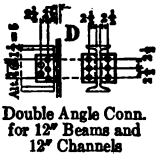


Single Angle Conn.
for 18" and 20" Beams

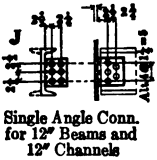


Single Angle Conn.
for 24" Beams

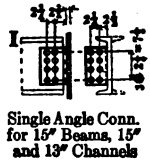
Angle Conn.
Beams, 15"
3" Channels



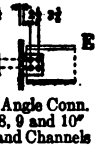
Double Angle Conn.
for 12" Beams and
12" Channels



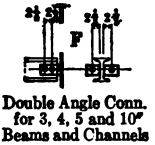
Single Angle Conn.
for 12" Beams and
12" Channels



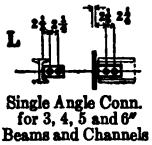
Single Angle Conn.
for 15" Beams, 15"
and 13" Channels



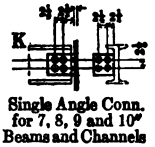
Angle Conn.
8, 9 and 10"
nd Channels



Double Angle Conn.
for 3, 4, 5 and 10"
Beams and Channels



Single Angle Conn.
for 3, 4, 5 and 6"
Beams and Channels



Single Angle Conn.
for 7, 8, 9 and 10"
Beams and Channels

s of beams having Standard Connections should be cut at least ¼ hort of distance to face of each connection and preferably ½ inch to allow for over-run in cutting.

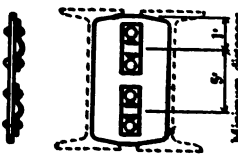
dimensions not given see tables of Weights and Dimensions of rd Beams and Channels.

Size	Shear: 12000 lbs. / 10000 lbs.	Minimum Strength of one Connection in Pounds	Wght. Angles only	Wght. Angles and Shop Rivets	Wght. Angles including Field Rivets	Diam. of Rivets	Diam. of Holes
wo 4×4×$\frac{7}{16}$ Angles 1′ 6″ long...		54000	34.0	37.0	43.0	¾	⅞
wo 4×4×$\frac{7}{16}$ Angles 1′ 3″ long...		45000	28.2	30.7	36.0	¾	⅞
wo 6×4×$\frac{7}{16}$ Angles 0′ 10″ long..		40500	23.8	26.9	31.0	¾	⅞
wo 6×4×$\frac{7}{16}$ Angles 0′ 7½″ long.		33750	17.9	20.3	23.0	¾	⅞
wo 6×4×$\frac{7}{16}$ Angles 0′ 5″ long . .		18000	11.9	13.8	16.0	¾	⅞
wo 6×4×$\frac{7}{16}$ Angles 0′ 3″ long . .		6750	7.1	8.0	9.0	¾	⅞
0′ 2½″ long for 5″ Is, 0′ 2″ long for 3″ and 4″.)							
ne 6×6×$\frac{7}{16}$ Angle 1′ 6″ long....		53040	25.8	31.1	36.0	¾	⅞
ne 6×6×$\frac{7}{16}$ Angle 1′ 3″ long....		44200	21.5	25.9	30.0	¾	⅞
ne 6×6×$\frac{7}{16}$ Angle 0′ 10″ long...		35360	14.3	18.0	22.0	¾	⅞
ne 6×6×$\frac{7}{16}$ Angle 0′ 7½″ long...		26520	10.7	12.8	15.0	¾	⅞
ne 6×6×$\frac{7}{16}$ Angle 0′ 5″ long....		15000	7.1	8.7	10.0	¾	⅞
ne 6×6×$\frac{7}{16}$ Angle 0′ 3″ long....	Bearing Value: Shop Rivets—54000 lbs. sq. in. / Field Rivets—40000 lbs. sq. in.	5625	4.3	5.1	6.0	¾	⅞
0′ 2 ½″ long for 5 Is, 0′ 2″ long for 3″ and 4″.)							

ns or Channels should not be loaded with a greater uniformly dis- d load (including the weight of the beam) than twice the "mini- strength of one connection," when Standard Connections are used, as shown by the tables of Safe Loads of Beams and Channels.

STANDARD STEEL SEPARATORS

MINIMUM WIDTH AND DIMENSIONS FOR STANDARD BEAMS



These separators, stronger and more durable than cast iron, are made from steel plate with riveted steel loops for bolts. They are cut accurately and ground to fit the profile of the beams.

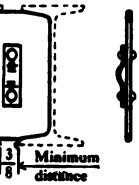
They can be furnished in any width greater than that given in the tables and to suit all requirements.

TWO BOLT SEPARATORS

Beams Connected				Separator					Bolts				
Size of Beam	Weight per Foot, Pounds	Out to Out of Flanges	Center to Center of Beams	Width	Height	Thickness	Weight of Separator	Add for each Additional In.	Diameter	Length of Bolt	Center to Center of Bolts	Weight of Bolts	Add for each Additional In.
24"	115.	16¼	8½	7¾	22¼	⅝	23¾	3.15	⅞	10¼	12	3.37	.28
	110.	16¼	8½	7¾	22¼	⅝	23¾	3.15	⅞	10¼	12	3.37	.28
	105.	16¼	8¾	7¾	22¼	⅝	23¾	3.15	⅞	10	12	3.31	.28
24"	100.	14¾	7¼	6¾	22¼	⅝	22¼	3.22	⅞	9½	12	3.18	.28
	95.	14¾	7¼	6¾	22¼	⅝	22¼	3.22	⅞	9¼	12	3.12	.28
	90.	14¾	7¼	6¾	22¼	⅝	22¼	3.22	⅞	9¼	12	3.12	.28
	85.	14¾	7¼	6¾	22¼	⅝	22¼	3.22	⅞	9	12	3.06	.28
	80.	14¾	7¼	6¾	22¼	½	22¼	3.22	⅞	9	12	3.06	.28
20"	100.	14¾	7¼	6¾	18¼	⅝	18¼	2.65	⅞	9½	12	3.18	.28
	95.	14¾	7¼	6¾	18¼	⅝	18¼	2.65	⅞	9½	12	3.18	.28
	90.	14¾	7¼	6¾	18¼	⅝	18¼	2.65	⅞	9¼	12	3.12	.28
	85.	14½	7½	6¾	18¼	⅝	18¼	2.65	⅞	9	12	3.06	.28
	80.	14¾	7¼	6¾	18¼	½	18¼	2.65	⅞	9	12	3.06	.28
20"	75.	13¾	6¾	6¼	18¼	⅝	16¾	2.65	⅞	8½	12	2.95	.28
	70.	13	6½	6¼	18¼	⅝	16¾	2.65	⅞	8¼	12	2.89	.28
	65.	13¼	6¾	6¼	18¼	½	16¾	2.65	⅞	8¼	12	2.89	.28
18"	80.	14¼	7¼	6¼	16½	⅝	15½	2.33	⅞	9½	9	3.18	.28
	75.	14¾	7¾	6¼	16½	⅝	15½	2.33	⅞	9¼	9	3.12	.28
	70.	14¾	7¼	6¼	16½	⅝	15½	2.33	⅞	9	9	3.06	.28
	75.	14¼	7¼	6¼	16½	½	15½	2.33	⅞	9	9	3.06	.28
18"	70.	13¼	6¾	5⅝	17	⅝	14¾	2.40	⅞	8½	9	2.89	.28
	65.	12¾	6½	5⅝	17	⅝	14¾	2.40	⅞	8¼	9	2.89	.28
	60.	12¼	6¼	5⅝	17	⅝	14¾	2.40	⅞	8	9	2.83	.28
	55.	12¼	6¼	5⅝	17	½	14¾	2.40	⅞	8	9	2.83	.28
15"	60.	13¼	7¼	6	13¾	⅝	12	1.89	⅞	9½	7½	3.18	.28
	55.	13¾	7¾	6	13¾	⅝	12	1.89	⅞	9¼	7½	3.12	.28
	50.	13¾	7	6	13¾	⅝	12	1.89	⅞	9	7½	3.06	.28
	45.	13½	6¾	6	13¾	⅝	12	1.89	⅞	8¾	7½	3.00	.28
	42.	13¼	6¾	6	13½	½	12	1.89	⅞	8¾	7½	3.00	.28
15"	45.	12¾	6¾	5¾	13¾	⅝	9	1.46	⅞	8½	7½	2.95	.28
	42.	12¾	6½	5¾	13¾	⅝	9	1.46	⅞	8½	7½	2.95	.28
	38.	12¾	6½	5¾	13¾	⅝	9	1.46	⅞	8	7½	2.83	.28
	33.	12¾	6¼	5¾	13¾	½	9	1.46	⅞	8	7½	2.83	.28
15"	33.	11¾	6¼	5½	14¼	⅝	8¾	1.50	⅞	7¾	7½	2.76	.28
	30.	11¾	6¼	5½	14¼	⅝	8¾	1.50	⅞	7½	7½	2.70	.28
	27.	11½	5¾	5½	14¼	⅝	8¾	1.50	⅞	7½	7½	2.70	.28
	25.	11¼	5¾	5½	14¼	⅝	8¾	1.50	⅞	7½	7½	2.70	.28
12"	40.	11¾	6¾	5¼	11	⅝	6¾	1.17	⅞	8¼	5	2.95	.28
	35.	11¾	6¾	5¼	11	⅝	6¾	1.17	⅞	7¾	5	2.76	.28
	31.5	11¾	6¾	5¼	11	⅝	6¾	1.17	⅞	7½	5	2.70	.28
	30.	11¾	6¾	5¼	11	⅝	6¾	1.17	⅞	7	5	2.66	.28
12"	35.	10¼	5¼	5	11¼	⅝	6½	1.20	⅞	7	5	2.88	.28
	31.5	10¼	5¼	5	11¼	⅝	6½	1.20	⅞	6¾	5	2.82	.28

STANDARD STEEL SEPARATORS

NIMUM WIDTH AND DIMENSIONS FOR STANDARD BEAMS



These separators, stronger and more durable than cast iron, are made from steel plate with riveted steel loops for bolts. They are cut accurately and ground to fit the profile of the beams.

They can be furnished in any width greater than that given in the tables and to suit all requirements.

ONE BOLT SEPARATORS

MS CONNECTED			SEPARATOR					BOLT			
Foot Pounds	Out to Out of Flanges	Center to Center of Beams	Width	Height	Thickness	Weight of Separator	Add for each Additional Inch	Diameter	Length of Bolt	Weight of Bolt	Add for each Additional In.
5.	12 1/16	6 1/16	5 3/4	13 3/4	3/8	8 3/4	1.46	3/4	8 1/2	1.47	.12
0.	12 3/4	6 7/16	5 3/4	13 3/4	3/8	8 3/4	1.46	3/4	8 1/2	1.47	.12
5.	12 7/16	6 7/16	5 3/4	13 3/4	3/8	8 3/4	1.46	3/4	8	1.41	.12
0.	12 7/16	6 7/16	5 3/4	13 3/4	3/8	8 3/4	1.46	3/4	8	1.41	.12
5.	11 7/8	6 1/16	5 1/2	14 1/8	3/8	8 1/2	1.50	3/4	7 3/4	1.38	.12
0.	11 11/16	6 7/16	5 1/2	14 1/8	3/8	8 1/2	1.50	3/4	7 1/2	1.35	.12
5.	11 1/2	5 15/16	5 1/2	14 1/8	3/8	8 1/2	1.50	3/4	7 1/2	1.35	.12
2.	11 7/16	5 15/16	5 1/2	14 1/8	3/8	8 1/2	1.50	3/4	7 1/2	1.35	.12
5.	11 11/16	6 1/16	5 1/4	11	3/8	6 1/2	1.17	3/4	8 1/4	1.47	.12
0.	11 7/16	5 15/16	5 1/4	11	3/8	6 1/2	1.17	3/4	7 3/4	1.38	.12
5.	11 1/4	5 15/16	5 1/4	11	3/8	6 1/2	1.17	3/4	7 1/2	1.35	.12
0.	10 15/16	5 11/16	5 1/4	11	3/8	6 1/2	1.17	3/4	7	1.29	.12
5.	10 1/16	5 1/16	5	11 1/4	3/8	6 1/4	1.20	3/4	7	1.29	.12
1.5	10 3/16	5 3/16	5	11 1/4	3/8	6 1/4	1.20	3/4	6 3/4	1.26	.12
0.	10 3/16	5 1/16	4 3/4	9 3/8	3/8	5	.99	3/4	7 1/4	1.32	.12
5.	10 1/16	5 3/16	4 3/4	9 3/8	3/8	5	.99	3/4	7	1.29	.12
0.	10	5 1/16	4 3/4	9 3/8	3/8	5	.99	3/4	6 3/4	1.25	.12
5.	9 3/4	5 1/16	4 3/4	9 3/8	3/8	5	.99	3/4	6 1/2	1.23	.12
5.	9 7/8	5 1/16	4 3/8	8 3/8	3/8	4 1/2	.89	3/4	6 3/4	1.25	.12
0.	9 7/16	4 15/16	4 3/8	8 3/8	3/8	4 1/2	.89	3/4	6 1/2	1.23	.12
5.	9 1/4	4 3/4	4 3/8	8 3/8	3/8	4 1/2	.89	3/4	6 1/4	1.20	.12
1.	9	4 11/16	4 3/8	8 3/8	3/8	4 1/2	.89	3/4	6	1.17	.12
5.5	8 11/16	4 1/16	4	7 3/8	1/4	2 1/2	.52	3/4	6	1.17	.12
3.	8 5/8	4 1/16	4	7 3/8	1/4	2 1/2	.52	3/4	6	1.17	.12
0.5	8 7/16	4 5/16	4	7 3/8	1/4	2 1/2	.52	3/4	5 3/4	1.14	.12
8.	8 1/4	4 1/4	4	7 3/8	1/4	2 1/2	.52	3/4	5 1/2	1.11	.12
0.	8 1/16	4 1/16	3 3/4	6 1/2	1/4	2	.46	3/4	5 3/4	1.14	.12
7.5	7 7/8	4 1/8	3 3/4	6 1/2	1/4	2	.46	3/4	5 1/2	1.11	.12
5.	7 11/16	4	3 3/4	6 1/2	1/4	2	.46	3/4	5 1/2	1.08	.12
7.25	7 1/16	4	3 1/2	5 1/2	1/4	1 3/4	.38	3/4	5 1/2	1.11	.12
4.75	7 1/16	3 7/8	3 1/2	5 1/2	1/4	1 3/4	.38	3/4	5 1/4	1.08	.12
2.25	7 1/16	3 3/4	3 1/2	5 1/2	1/4	1 3/4	.38	3/4	5	1.05	.12
7.	6 15/16	3 5/8	3 1/4	.....	....	1/4	.14	3/4	5 3/4	1.14	.12
4.75	6 11/16	3 5/8	3 1/4	.....	....	1/4	.14	3/4	5 1/4	1.08	.12
2.25	6 5/8	3 1/8	3 1/8	.....	....	1/8	.14	3/4	4 3/4	1.02	.12
9.75	6 1/16	3 1/16	3 1/8	.....	....	1/8	.14	3/4	4 1/2	.99	.12
0.5	6 1/16	3 1/16	2 7/8	.....	....	3/8	.14	3/4	4 3/4	1.02	.12
9.5	6	3 1/16	2 7/8	.....	....	3/8	.14	3/4	4 1/2	.99	.12
8.5	5 7/8	3 1/16	2 7/8	.....	....	3/8	.14	3/4	4 1/2	.99	.12
7.5	5 3/4	3 1/16	2 7/8	.....	....	1/8	.14	3/4	4 1/4	.96	.12

h Gas Pipe Separators are generally used for 3 inch, 4 inch and 5 inch

JOIST ANCHORS AND TIE-STRAPS

ANY FORM OF ANCHOR OR TIE CAN BE FURNISHED

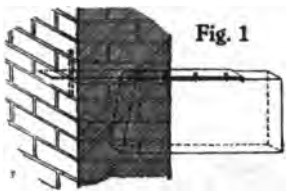


Fig. 1

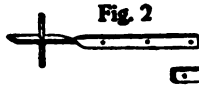


Fig. 2

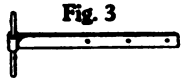


Fig. 3

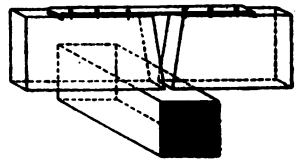


Fig. 4

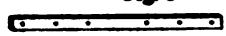


Fig. 5

Fig. 6

Joist Anchors are used on all floors having wood joists except floors at or near the ground and are also used for flat wood roofs, where joists rest on masonry walls or adjoin same.

Joist Tie-Straps are used on all floors having wood joists where they meet at a wood or steel girder, and for tieing the ends of wood girders together.

Joist Anchors are usually spaced every five feet all around a building and where joists run parallel to a wall are made long enough to permit of spiking to three joist, i. e., to project 33 inches from the wall for joist 16 inches on center, or 25 inches for joist 12 inches on center.

Joist Tie-Straps are spaced the same as joist anchors and are placed opposite to them. They are some times used where joists meet on an interior masonry wall.

Size of Anchor	Weight of Joist Anchors (Fig. 1)					Weight of Tie-Straps					Size of Tie-Strap
	Size of Pin	18″	24″	30″	36″	42″	18″	24″	30″	36″	42″	
1¼″×¾″	½″ diam.×6″	1.92	2.45	2.98	3.51	4.04	1.59	2.12	2.65	3.18	3.71	1¼″×¾″
1½″×¾″	⅝″ diam.×8″	2.60	3.23	3.88	4.52	5.16	1.92	2.56	3.20	3.84	4.48	1½″×¾″
1½″×⅝″	⅝″ " ×8″	2.91	3.54	4.19	4.83	5.47	2.23	2.87	3.51	4.15	4.79	1½″×⅝″
1½″×⅜″	⅝″ " ×8″	3.24	3.87	4.52	5.16	5.80	2.56	3.20	3.84	4.48	5.12	1½″×⅜″
1¾″×¾″	⅝″ diam.×8″	2.91	3.65	4.40	5.14	5.89	2.23	2.97	3.72	4.46	5.21	1¾″×¾″
1¾″×⅝″	⅝″ " ×8″	3.28	4.02	4.77	5.51	6.26	2.60	3.34	4.09	4.83	5.58	1¾″×⅝″
1¾″×⅜″	⅝″ " ×8″	3.65	4.39	5.14	5.88	6.63	2.97	3.71	4.46	5.20	5.95	1¾″×⅜″
2″ ×¾″	¾″ diam.×8″	3.55	4.40	5.25	6.10	6.95	2.55	3.40	4.25	5.10	5.95	2″ ×¾″
2″ ×⅝″	¾″ " ×8″	3.97	4.82	5.67	6.52	7.37	2.97	3.82	4.67	5.52	6.37	2″ ×⅝″
2″ ×⅜″	¾″ " ×8″	4.40	5.25	6.10	6.95	7.80	3.40	4.25	5.10	5.95	6.80	2″ ×⅜″
2½″×¾″	¾″ diam.×8″	4.18	5.24	6.30	7.36	8.42	3.18	4.24	5.30	6.36	7.42	2½″×¾″
2½″×⅝″	¾″ " ×8″	4.71	5.57	6.83	7.89	8.95	3.71	4.57	5.83	6.89	7.95	2½″×⅝″
2½″×⅜″	¾″ " ×8″	5.25	6.11	7.37	8.43	9.49	4.25	5.11	6.37	7.43	8.49	2½″×⅜″

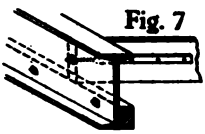


Fig. 7

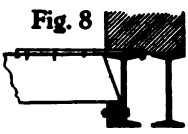


Fig. 8

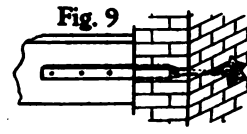
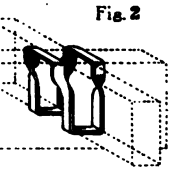


Fig. 9

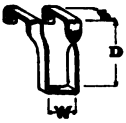
STIRRUPS OR JOIST HANGERS

Fig. 2



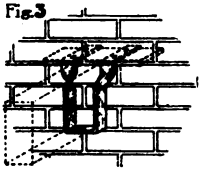
DOUBLE STIRRUP

Fig. 1



SINGLE STIRRUP

Fig. 3



WALL HANGER

e following sizes of iron should in general be used for the size of joist rted:

Size of t or Timber e Supported	Section of Stirrup	Capacity of Stirrup	Size of Joist or Timber to be Supported	Section of Stirrup	Capacity of Stirrup
× 8 to 3×10	¼×2½	7500 lbs.	8×12 to 4×14	½×3½	21000 lbs.
×10 to 4×12	⅜×2½	11250 lbs.	6×14	½×4	24000 lbs.
×12 to 3×14	⅜×3	13500 lbs.	8×14 to 10×14	⅝×4	30000 lbs.

less otherwise specified, stirrups are furnished ¼ inch smaller than nal size of timber or joist.

Nominal Size W×D×S	Usual Size of Stirrups	Approximate Weight		
		Single	Double	*
2× 8× 2	¼×2½	4.59	7.77	.36
2×10× 2	¼×2½	5.30	9.18	.36
2×12× 2	¼×2½	5.99	10.60	.36
2×14× 2	⅜×2½	10.10	18.07	.53
3×10× 3	¼×2½	5.83	9.89	.36
3×12× 3	⅜×2½	9.83	17.01	.53
3×14× 3	⅜×3	13.09	22.98	.64
4×10× 4	⅜×2½	9.57	15.95	.53
4×12× 4	⅜×3	12.76	21.69	.64
4×14× 4	½×3½	21.81	37.68	.66
6×10× 6	⅜×2½	11.16	18.07	.53
6×12× 6	⅜×3	14.69	24.25	.64
6×14× 6	½×3½	24.79	41.65	.66
6×16× 6	½×4	30.60	52.12	1.13
8×10× 8	⅜×3	15.32	24.25	.64
8×12× 8	½×3½	25.78	41.65	.66
8×14× 8	⅝×4	39.66	65.16	1.41
8×16× 8	⅝×4	42.50	70.83	1.41
9×10× 9	½×3½	25.78	40.65	.66
9×12× 9	½×4	31.72	51.00	1.13
9×14× 9	⅝×4	42.50	69.41	1.41
9×16× 9	⅝×4	45.33	75.05	1.41
10×10×10	½×3½	27.23	42.64	.66
10×12×10	½×4	33.36	53.25	1.13
10×14×10	⅝×4	44.62	72.25	1.41

dd to weight for each increase of one inch in width of support.
ance S)
el or Cast Iron Post Caps can be furnished in any size desired on short .

WEIGHTS OF CAST IRON COLUMNS

FOR HOLLOW ROUND, SQUARE AND RECTANGULAR COLUMNS PER LINEAL FOOT

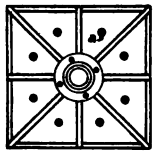
Thickness	½ inch		⅝ inch		¾ inch		⅞ inch		1 inch		1⅛ inch		1¼ inch		1⅜ inch		1½ inch		1⅝ inch		1¾ inch		2 inch	
Diameter and Size, Inches	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square
4	17.2	21.8	20.7	26.4	24.0	30.4	26.8	34.2	29.5	37.5	31.7	40.4	33.7	43.0										
4× 6	....	28.0	....	34.2	.....	39.8	.....	45.1	.....	50.0	.....	54.5	.....	58.6										
4× 8	....	34.3	....	42.0	.....	49.2	.....	56.1	.....	62.5	.....	68.5	.....	74.2										
4×10	....	40.5	....	49.8	.....	58.6	.....	67.0	.....	75.0	.....	82.6	.....	89.8										
5	22.1	28.0	26.8	34.2	31.3	39.8	35.4	45.1	39.3	50.0	48.9	54.5	46.0	58.6										
5× 7	....	34.3	....	42.0	.....	49.2	.....	56.1	.....	62.5	.....	68.5	.....	74.2										
5×12	....	49.9	....	61.5	.....	72.7	.....	83.4	.....	93.8	.....	103.7	.....	113.3										
6	26.9	34.3	32.9	42.0	39.0	49.2	43.9	56.1	49.1	62.5	53.7	68.5	58.3	74.2										
6× 8	....	40.5	....	49.8	.....	58.6	.....	67.0	.....	75.0	.....	82.6	.....	89.8										
6×10	....	46.8	....	57.6	.....	68.0	.....	77.9	.....	87.5	.....	96.7	.....	105.5										
6×12	....	53.0	....	65.4	.....	77.3	.....	88.9	.....	100.0	.....	110.7	.....	121.1										
7	....	....	39.0	49.7	46.0	58.6	52.5	66.8	59.0	75.0	64.8	82.4	70.6	89.8	75.8	96.5								
7×10	....	....	....	61.5	.....	72.7	.....	83.4	.....	98.3	.....	103.7	.....	113.3	.....	122.3								
7×12	....	....	....	69.3	.....	82.0	.....	94.3	.....	106.3	.....	117.8	.....	128.9	.....	139.4								
8	....	....	45.1	57.6	53.4	68.0	61.1	77.9	69.1	87.5	75.8	96.7	82.7	105.5	89.3	113.7	95.8	121.9						
8×10	....	....	....	65.4	.....	77.3	.....	88.9	.....	100.0	.....	110.7	.....	121.1	.....	130.8	.....	140.6						
8×12	....	....	....	73.2	....	86.7	.....	99.8	.....	112.5	.....	124.8	.....	136.7	.....	148.0	.....	159.4						
8×16	....	....	....	88.8	.....	105.5	.....	121.7	.....	137.5	.....	152.9	.....	168.0	.....	182.3	.....	196.9						

FOR HOLLOW ROUND, SQUARE AND RECTANGULAR COLUMNS PER LINEAL FOOT

Thickness	½ inch		⅝ inch		¾ inch		⅞ inch		1 inch		1⅛ inch		1¼ inch		1⅜ inch		1½ inch		1⅝ inch		1¾ inch		2 inch	
Diameter and Size, Inches	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square	Round	Square
9	.....	.....	.....	.....	60.7	77.3	69.8	88.9	78.6	100.0	86.9	110.7	95.1	121.0	102.9	130.8	110.5	140.6	117.6	149.5	124.3	158.6	.....	.....
9X12	.....	.....	.....	.....	.....	91.4	.....	105.3	.....	118.8	.....	131.8	.....	144.5	.....	156.6	.....	168.8	.....	179.9	.....	191.4	.....	.....
9X16	.....	.....	.....	.....	.....	110.2	.....	127.2	.....	143.8	.....	159.9	.....	175.8	.....	190.9	.....	206.3	.....	220.5	.....	235.2	.....	.....
10	.....	.....	.....	68.0	86.7	78.5	99.8	88.4	112.5	98.1	124.8	107.4	136.7	116.5	148.0	125.3	159.4	133.6	169.8	142.0	180.5	157.2	200.0	
10X12	.....	.....	.....	.....	96.1	.....	110.8	.....	125.0	.....	138.8	.....	152.3	.....	165.2	.....	178.1	.....	190.1	.....	202.3	.....	225.0	.....
10X16	.....	.....	.....	.....	114.8	.....	132.6	.....	150.0	.....	167.0	.....	183.6	.....	199.5	.....	215.6	.....	230.6	.....	246.1	.....	275.0	.....
11	.....	.....	.....	75.5	96.1	87.0	110.8	98.2	125.0	109.1	138.8	120.1	152.3	130.0	165.2	140.0	178.1	149.6	190.1	158.9	202.3	176.8	225.0	
12	.....	.....	.....	92.8	105.5	105.6	121.7	108.0	137.5	130.1	152.9	131.4	168.0	153.4	183.2	154.7	196.6	175.5	210.4	186.1	224.2	195.8	250.0	
12X16	.....	.....	.....	.....	124.2	.....	143.6	.....	162.5	.....	181.0	.....	199.2	.....	216.6	.....	234.4	.....	250.9	.....	268.0	.....	300.0	.....
12X20	.....	.....	.....	.....	143.0	.....	165.4	.....	187.5	.....	209.2	.....	230.5	.....	251.2	.....	271.9	.....	291.5	.....	311.7	.....	350.0	.....
12X24	.....	.....	.....	.....	161.7	.....	187.3	.....	212.5	.....	237.3	.....	261.7	.....	285.3	.....	309.4	.....	332.0	.....	355.5	.....	400.0	.....
13	.....	.....	.....	.....	.....	.....	.....	117.5	150.0	131.1	167.0	144.2	183.6	157.0	199.5	169.4	215.6	181.5	230.6	193.3	246.1	216.0	275.0	
14	.....	.....	.....	.....	.....	.....	.....	128.1	162.5	142.3	181.0	156.5	199.2	170.5	216.6	184.1	234.5	197.4	250.9	210.5	268.0	235.7	300.0	
15	.....	.....	.....	.....	.....	.....	.....	137.5	175.0	153.1	195.1	169.4	214.9	183.7	233.8	198.9	253.2	212.5	271.2	226.7	289.8	255.3	325.0	
16	.....	.....	.....	.....	.....	.....	.....	147.3	187.5	164.1	209.2	181.0	230.5	197.2	251.2	213.5	271.9	229.1	291.5	244.5	311.7	274.9	350.0	

CAST IRON BASES FOR COLUMNS

COMMON SHAPES, TABLE FOR CAST IRON COLUMN BASES AND USEFUL FORMULAE

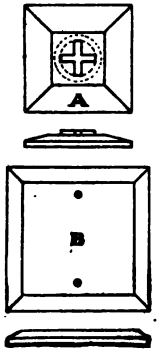


BASE C

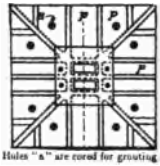
FOR ROUND C. I. COLS.

The height H should be equal to the projection P and D should be equal to the diameter of the column. The thickness of all portions of the base should be equal, or nearly so, to that of the column above the base.

The projection of the flange C should be at least three inches.



Plates beveled to one-half inch at edges.



BASE D

FOR STEEL COLS.

Bases should be proportioned so as to have the thickness of metal nearly equal throughout to prevent unequal cooling of the metal.

Allowable stresses in cast iron:
Compres'n, 12,000 lbs. per sq. in.
Tension .... 2,500 lbs. per sq. in.
Shear ..... 1,500 lbs. per sq. in.

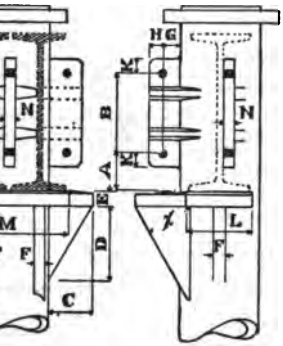
Bearing value of ordinary masonry, 250 lbs. per sq. in.; of cut stone or 1:2:4 concrete, 500 lbs. per sq. in.

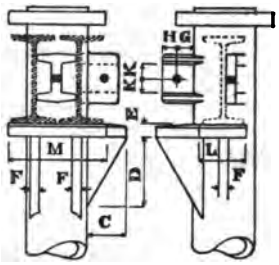
Flat Base Plates	Thickness of Metal	Size of Column	Size of Plate (Ordinary Masonry)	Approximate Weight	Size of Plate (Cut Stone or Concrete)	Approximate Weight	Safe Load in Pounds	Bases for Steel Columns
W = pressure under the plate in lbs. per sq. in.	5	½	14x14x 1½	90	10x10x1½	40	49,000	T = distance from center of column to outside of column flange.
W = Load on columns in lbs.	5	1	16x16x 2½	110	12x12x2	75	64,000	X = distance to center of gravity of 1-2 of base.
A = Area of plate in sq. in.	6	½	16x16x 2	105	12x12x1¾	65	64,000	C = distance to center of gravity from bottom.
B = one side of square plate in inches.	6	1	18x18x 2½	165	14x14x2½	115	81,000	D = distance to center of gravity from top.
D = diameter of round column or side of square post in inches.	7	¾	18x18x 2½	140	14x14x2	105	81,000	A = thickness of top plate.
A′ = difference between area of plate and the sectional area of column.	7	1	20x20x 2½	205	16x16x2½	135	100,000	B = thickness of bottom.
P = projection of edge of plate beyond col. in inches.	8	¾	20x20x 2½	230	16x16x2½	125	100,000	I = Moment of Inertia.
t = thickness of plate in inches.	8	1	24x24x 6	330	18x18x2½	185	144,000	M = maximum Bending Moment.
then	9	1	24x24x 6	270	18x18x2½	175	144,000	M_1 = Bending Moment in any panel of bottom plate having ribs on three sides.
$A=\frac{W}{w}$, $B=\sqrt{A}$, and	9	1½	30x30x 8	555	20x20x2½	235	200,000	P = pressures sustained by any panel of bottom plate in pounds.
$P=\frac{B-D}{2}$	10	1	28x28x 7	360	20x20x2½	235	200,000	$M=\frac{Wx}{2}-\frac{WT}{4}=W\left(\frac{x}{2}-\frac{T}{4}\right)$
$t=\sqrt{\frac{w.P.A'}{D}}\div 80.$	10	1½	32x32x10	715	24x24x6	370	256,000	$M_1=\frac{pl}{15}=\frac{(W\div A)a^2}{15}$
	11	1	30x30x 8	420	24x24x6	270	225,000	Stress at bottom of shoe = $\left(\frac{Mx12}{I}\right)C$
	11	1½	36x36x10	840	28x28x7	490	324,000	
	12	1	32x32x10	515	28x28x7	360	256,000	Stress at top of shoe = $\left(\frac{Mx12}{I}\right)D$
	12	1½	38x38x12	1120	30x30x8	570	361,000	

Shaft of bases for cast iron columns should project above flange ½ in. to allow for planing.
Tops of flat base plates and top of bases for steel columns should be planed.
Bolt holes for cast column bases may be cored, but for steel column bases should be drilled.

AST IRON COLUMN BRACKETS AND LUGS

DIMENSIONS AND WEIGHTS FOR STANDARD BEAMS





Top of Shelf on Bracket should slope ⅛ inch to a foot.
Core all holes for ¾ inch bolts.

mensions in inches. All weights and strength of brackets in pounds. Double weights for II

	A	B	C	D	E	F	G	H	K	L	M	N	Weight of Single Beam Bracket	Weight of Single Beam Lug	Strength of one Single Beam Bracket
5	6	12	6	10½	1⅜	1¾	2	1½	1½	8¼	16½	1	40	16	119440
0	6	12	6	10½	1½	1½	2	1½	1½	7½	15	1	31½	16	102380
	6	12	5½	9½	1½	1¼	2	1½	1½	7½	15	1	25	16	77200
	4	12	5½	9½	1¼	1¼	2	1½	1½	6½	13	1	20	16	77200
5	4½	9	5	9	1¾	1¼	2	1½	1½	7½	15	1	23	13	69030
5	4½	9	5	9	1¼	1¼	2	1½	1½	6½	13	1	17½	13	69030
0	3¾	7½	5	9	1¾	1¼	2	1½	1½	7	14	1	19	11¼	69030
0	3¾	7½	5	9	1¼	1¼	2	1½	1½	6½	13	1	17½	11½	69030
0	3¾	7½	5	9	1¾	1¼	2	1½	1½	6	12	1	16½	11½	69030
0	3½	5	4	7	1	1	2	1½	1½	5¾	11½	1	10	9	43880
½	3½	5	4	7	1	1	2	1½	1½	5½	11	1	9¼	9	43880
5	....	....	4	7	¾	¾	2	1½	1½	5¼	10½	1	8½	3½	32900
0	....	....	4	7	¾	¾	2	1½	1½	5	10	¾	8	3	32900
5	....	....	4	7	¾	¾	2	1½	1½	4½	9	¾	7	3	32900
0	....	....	4	7	¾	¾	2	1½	1½	4	8	¾	6	3	32900

e resistance of a single bracket to shearing is determined by
lying the height D by the thickness F, and the product by
pounds. The resistance of the shelf to shearing is not usually
ered.

resistance of a single bracket to crushing may be found by
lying the distance X by the thickness F, and the product by
pounds.

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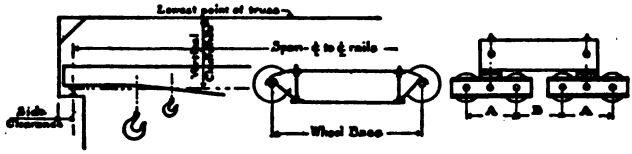
12 BOILERS & TANKS

TRAVELING CRANES

RAILS, CLEARANCE, DIMENSIONS AND WHEEL LOADS



TYPICAL ELECTRIC TRAVELING CRANES

Capacity in Tons	Span	Wheel Base	Maximum Wheel Load in Pounds	Side Clearance	Vertical Clearance	Weight of Rails Pounds per Yard	
						Plate Girders	Beams
5	40	8′ 6″	12000	10″	6′ 0″	40	40
	60	9′ 0″	13000	10″	6′ 0″	40	40
10	40	9′ 0″	19000	10″	6′ 0″	45	40
	60	9′ 6″	21000	10″	6′ 0″	45	40
15	40	9′ 6″	25000	10″	7′ 0″	50	50
	60	10′ 0″	29000	10″	7′ 0″	50	50
20	40	10′ 0″	33000	12″	7′ 0″	55	50
	60	10′ 6″	36000	12″	7′ 0″	55	50
25	40	10′ 0″	40000	12″	8′ 0″	60	50
	60	10′ 6″	44000	12″	8′ 0″	60	50
30	40	10′ 6″	48000	12″	8′ 0″	70	60
	60	11′ 0″	52000	12″	8′ 0″	70	60
40	40	11′ 0″	64000	12″	9′ 0″	80	60
	60	12′ 0″	70000	12″	9′ 0″	80	60
50	40	11′ 0″	72000	14″	9′ 0″	100	60
	60	12′ 0″	80000	14″	9′ 0″	100	60
60	40	13′ 0″	88000	16″	9′ 0″	100	.....
	60	14′ 0″	94000	16″	9′ 0″	100	.....
	80	15′ 0″	103000	16″	9′ 0″	100	.....
		A B					
60	40	3′6″ 5′4″	44000	16″	10′ 6″	100	.....
	60	3′6″ 5′4″	47000	16″	10′ 6″	100	.....
	80	3′6″ 5′4″	51500	16″	10′ 6″	100	.....

TRAVELING CRANES — CONTINUED

TYPICAL ELECTRIC TRAVELING CRANES CONTINUED

ty s	Span	Wheel Base	Maximum Wheel Load in Pounds	Side Clearance	Vertical Clearance	Weight of Rails Pounds per Yard	
						Plate Girders	Beams
		A B					
	40	5′0″ 6′0″	55000	16″	12′ 0″	100	.....
	60	5′0″ 6′0″	60000	16″	12′ 0″	100	.....
	80	5′0″ 6′0″	64000	16″	12′ 0″	100	.....
	40	5′0″ 6′0″	83000	19″	13′ 6″	100	.....
	60	5′0″ 6′0″	86000	19″	13′ 6″	100	.....
	80	5′0″ 6′0″	89000	19″	13′ 6″	100	.....
	40	6′0″ 6′0″	130000	20″	16′ 0″	150	.....
	60	6′0″ 6′0″	134000	20″	16′ 0″	150	.....
	80	6′0″ 6′0″	139000	20″	16′ 0″	150	.....

ds, clearances, etc., given above are for end carriages of ic Cranes.

HAND CRANES

TYPICAL HAND CRANES

y s	Span	Wheel Base	Maximum Wheel Load in Pounds	Side Clearance	Vertical Clearance	Weight of Rails Pounds per Yard	
						Plate Girders	Beams
	30	4′ 0″	3100	7″	4′ 0″	30	30
	50	5′ 0″	4000	7″	4′ 0″	30	30
	30	4′ 0″	5400	8″	4′ 6″	30	30
	50	5′ 0″	6500	8″	4′ 0″	30	30
	30	6′ 0″	8000	9″	5′ 0″	35	30
	50	7′ 0″	9200	9″	5′ 0″	35	30
	30	6′ 0″	10500	10″	5′ 0″	40	35
	50	7′ 0″	11800	10″	5′ 0″	40	35
	30	7′ 0″	13000	10″	5′ 0″	40	40
	50	8′ 0″	14400	10″	5′ 6″	40	40
	30	7′ 0″	20700	10″	5′ 6″	45	45
	50	8′ 0″	22300	10″	5′ 6″	45	45
	30	7′ 0″	26000	10″	5′ 6″	50	50
	50	8′ 0″	28000	10″	5′ 6″	50	50
	30	8′ 0″	32300	12″	6′ 0″	55	50
	50	8′ 0″	35000	12″	6′ 0″	55	50

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12 BOILERS & TANKS

ALLOWABLE WORKING UNIT STRESSES

IN POUNDS, PER SQUARE INCH

KIND OF TIMBER	Tension		Compression			Transverse		Shearing	
				With Grain					
	1 With Grain	2 Across Grain	3 End Bearing	4 Columns under 15 Diameters	5 Across Grain	6 Extreme Fibre Stress	7 Modulus of Elasticity	8 With Grain	9 Across Grain
Factor of Safety	Ten	Ten	Five	Five	Four	Six	Two	Four	Four
White Oak	1000	200	1400	900	500	1000	550000	200	1000
White Pine	700	50	1100	700	200	700	500000	100	500
Southern Long Leaf or Georgia Yellow Pine	1220	60	1600	1000	350	1200	850000	150	1250
Douglas, Oregon and Yellow Fir	1200	.....	1600	1200	300	1100	700000	150	.....
Washington Fir or Pine (Red Fir)	1000	.....	.....	.....	.....	800	.....	.....	.....
Northern or Short Leaf Yellow Pine	900	50	1200	800	250	1000	600000	100	1000
Red Pine	900	50	1200	800	200	800	600000	.....	.....
Norway Pine	800	.....	1200	800	200	700	600000	.....	.....
Canadian (Ottawa) White Pine	1000	.....	.....	1000	.....	.....	.....	100	.....
Canadian (Ontario) Red Pine	1000	.....	.....	1000	.....	800	700000	100	.....
Spruce and Eastern Fir	800	50	1200	800	200	700	600000	100	750
Hemlock	600	.....	.....	800	150	600	450000	100	600
Cypress	600	.....	1200	800	200	800	450000	.....	.....
Cedar	800	.....	1200	800	200	800	350000	.....	400
Chestnut	900	.....	.....	1000	250	800	500000	150	400
California Redwood	700	.....	.....	800	200	750	350000	100	.....
California Spruce	.....	.....	.....	800	.....	800	600000	.....	.....

CHICAGO—JOSEPH T. RYERSON & SON—NEW YORK

12—BOILERS AND TANKS

THE data on boilers and tanks have been largely made up in our own Engineering Department from formulae and experience not only generally accepted as standard but which we have found to stand the test of practical application.

In the use of these tables, particularly those covering riveted joints, it should be borne in mind that any change in the strengths or factors from those used as the basis of the table will change the results.

We have an accumulation of information covering boiler, tank and related subjects which would not be of sufficient general interest to warrant inclusion here. We will be glad at all times to answer questions or furnish general information bearing upon our customers' special problems.

B 67
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12 BOILERS & TANKS
PAGES 1200 TO 1299

12—BOILERS AND TANKS

	Page
Riveted Joints	1201
Cylindrical Shells, Theoretical Bursting Pressure	1207
Gallons in Cylindrical Tanks	1208
Bolts, Stays and Suspension Rods, Strength of	1209
Standpipe Proportions	1210
Standpipe Weights	1211
Boiler Flanges, Sizes and Spacing of Rivets	1213
Pipe Flanges, Sizes and Spacing of Rivets and Bolts	1213
Pipe Flanges and Fittings, Standards for Drilling	1214
Dome Plates, Allowance for	1215
Water Pressure	1216
Boiler Head Designs	1217
Boiler Settings	1220
Boiler Plates, Typical Specifications	1224
Boilers, Safe Working Pressure	1224
Boiler Segments, Area of	1225
Boiler Tubes, Heating Surface, Dimensions and Weights	1226

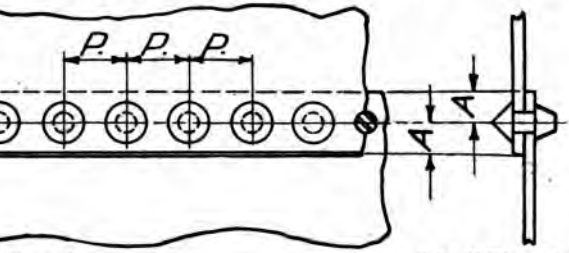
ASSOCIATED SUBJECTS

	Section
Plates for Standard Boilers	§ 2
Number of Braces in Standard Boilers	§ 4
Boiler Lugs	§ 4
Boiler Hangers	§ 4
Boiler Nozzles	§ 4
Manholes	§ 4
Shearing and Bearing Value of Rivets	§10

PAGES 1200 TO 1299

Complete Alphabetical Index will be found on last four pages of the book.

SINGLE RIVETED LAP JOINTS



000 pounds. S. S.—42,000 pounds.

ess	Diameter of Cold Rivet Inches	Maximum Diameter of Rivet Hole Inches	Efficiency in Per Cent	Pitch of Rivets "P" Inches	Gauge "A" Inches
	½	9/16	60.8	1 7/16	27/32
	½	9/16	60.8	1 7/16	27/32
	9/16	5/8	58.3	1½	7/8
	5/8	11/16	59.2	1 11/16	1 1/32
	5/8	11/16	59.2	1 11/16	1 1/32
	11/16	3/4	58.6	1 13/16	1 1/8
	11/16	3/4	58.6	1 13/16	1 1/8
	11/16	7/8	58.8	2 1/8	1 5/16
	13/16	7/8	57.6	2 1/8	1 5/16
	7/8	15/16	58.3	2 1/4	1 13/32
	7/8	15/16	57.6	2 1/4	1 13/32
	15/16	1	57.7	2 3/8	1 1/2
	1	1 1/16	56.4	2 7/16	1 17/32
	1	1 1/16	56.4	2 7/16	1 17/32
	1	1 1/16	54.8	2 15/16	1 17/32
	1	1 1/16	51.7	2 15/16	1 17/32
	1	1 1/16	48.7	2 15/16	1 17/32
	1	1 1/16	46.1	2 15/16	1 17/32
	1 1/16	1 1/8	48.6	2 15/16	1 21/32
	1 1/8	1 1/16	46.3	2 15/16	1 25/32
	1 1/8	1 1/16	44.2	2 15/16	1 25/32
	1 1/8	1 1/16	42.3	2 15/16	1 25/32
	1 1/8	1 1/16	40.5	2 15/16	1 25/32

ed and Recommended by Hartford Stm. Blr. Insp. and Ins. Co.

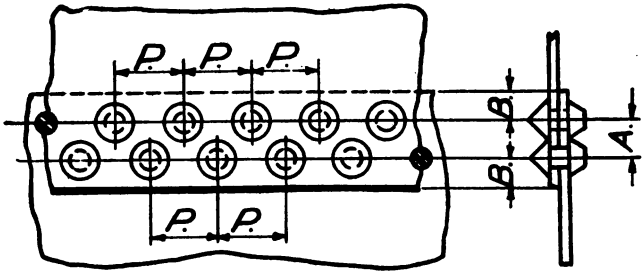
SINGLE RIVETED LAP GIRTH JOINTS

d and Recommended by Hartford Stm. Blr. Insp. and Ins. Co.
when Rivets of same diameter are used in Girth and Longitudinal Joints.

of Cold nches.....	½	9/16	5/8	11/16	¾	13/16	⅞	15/16	1	1 1/16	1 1/8	1 3/16	1 ¼
Diameter of ole, Inches.. Rivets "P,"	9/16	5/8	11/16	¾	13/16	⅞	15/16	1	1 1/16	1 1/8	1 3/16	1 ¼	1 5/16
..... " Inches...	1 5/8 7/8	1 ¾ 15/16	1 7/8 1 1/16	2 1 1/8	2 1/8 1 ¼	2 ¼ 1 5/16	2 3/8 1 7/16	2 7/16 1 ½	2 ½ 1 5/8	2 ¾ 1 11/16	2 7/8 1 13/16	3 1/16 1 7/8	3 ¼ 2

other tables for Longitudinal Joints.

DOUBLE RIVETED LAP JOINTS

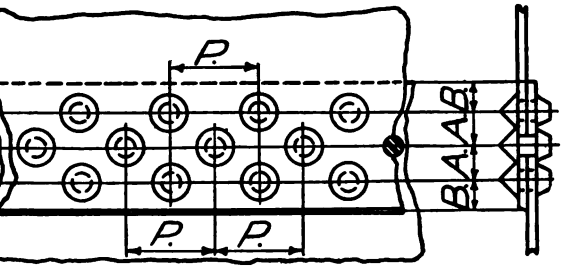


T. S.—55,000 pounds. S. S.—42,000 pounds.

Thickness of Plate Inches	Diameter of Cold Rivet Inches	Maximum Diameter of Rivet Hole Inches	Efficiency in Per Cent	Pitch of Rivets "P" Inches	Space "A" Inches	Gauge "B" Inches
5/16	1/2	17/32	75.0	2 1/4	1 1/16	11/16
* 11/32	1/2	17/32	75.0	2 1/4	1 1/16	11/16
* 1/4	1/2	17/32	73.6	2 1/8	1	11/16
1/4	5/8	11/16	71.8	2 11/16	1 3/16	1 3/16
* 9/32	9/16	5/8	72.0	2 1/16	1 1/16	1 1/16
* 5/16	9/16	11/16	71.8	2 1/16	1 1/16	1 1/16
* 11/32	5/8	11/16	71.8	2 1/16	1 1/16	1 1/16
* 11/32	11/16	3/4	72.0	2 1/16	1 1/16	1 1/16
* 3/8	3/4	11/16	71.7	2 1/16	1 1/16	1 1/16
* 13/32	3/4	11/16	70.0	2 1/16	1 1/16	1 1/16
* 7/16	7/8	11/16	70.0	3 1/16	1 1/16	1 1/16
* 15/32	7/8	11/16	70.0	3 1/16	1 1/16	1 1/16
* 1/2	11/16	1	70.3	3 1/16	2	1 1/16
1/2	1	1 1/16	70.4	3 1/16	2 1/16	1 1/16
17/32	1	1 1/16	70.4	3 1/16	2 1/16	1 1/16
9/16	1	1 1/16	66.9	3 1/16	2 1/16	1 1/16
17/32	1	1 1/16	63.4	3 1/16	2 1/16	1 1/16
9/16	1	1 1/16	60.2	3 1/16	2 1/16	1 1/16
19/32	1 1/16	1 1/16	65.9	3 1/16	2 1/16	1 1/16
19/32	1 1/16	1 1/16	62.9	3 1/16	2 1/16	1 1/16
19/32	1 1/16	1 1/16	60.2	3 1/16	2 1/16	1 1/16
5/8	1 1/16	1 1/16	57.7	3 1/16	2 1/16	1 1/16
21/32	1 1/16	1 1/16	60.8	4 1/16	2 1/16	1 1/16
11/16	1 1/16	1 1/16	58.5	4 1/16	2 1/16	1 1/16
11/16	1 1/16	1 1/16	56.3	4 1/16	2 1/16	1 1/16
11/16	1 1/16	1 1/16	54.3	4 1/16	2 1/16	1 1/16

*Designed and Recommended by Hartford Stm. Blr. Insp. and Ins. Co.

TRIPLE RIVETED LAP JOINTS



55,000 pounds. S. S.—42,000 pounds.

ness of te hes	Diameter of Cold Rivet Inches	Maximum Diameter of Rivet Hole Inches	Efficiency in Per Cent	Pitch of Rivets "P" Inches	Space "A" Inches	Gauge "B" Inches
	⅛	⅛	78.5	2 5/16	1 5/16	7/8
	⅛	⅛	78.5	2 5/16	1 5/16	7/8
	⅛	⅛	78.5	2 5/16	1 5/16	7/8
	⅛	⅛	78.2	2 7/8	1 3/4	1 1/16
	5/16	5/16	78.2	2 7/8	1 3/4	1 1/16
	5/16	11/32	77.0	3	1 7/8	1 1/16
	5/16	11/32	77.0	3	1 7/8	1 1/16
	5/16	11/32	77.0	3	1 7/8	1 1/16
	3/4	13/32	75.0	3 1/4	2 1/8	1 1/2
	3/4	13/32	75.0	3 1/2	2 1/8	1 1/2
	3/4	13/32	75.0	3 5/8	2 1/4	1 1/2
	3/4	13/32	75.0	3 3/4	2 3/8	1 1/2
	7/8	15/32	75.0	3 3/4	2 3/8	1 11/16
	7/8	15/32	75.0	3 3/4	2 3/8	1 11/16
	7/8	15/32	75.0	3 3/4	2 3/8	1 11/16
	7/8	15/32	74.9	3 3/4	2 3/8	1 11/16
	1	1 1/16	75.0	4 1/4	2 11/16	1 11/16
	1	1 1/16	75.0	4 1/4	2 11/16	1 11/16
	1	1 1/16	72.8	4 1/4	2 11/16	1 11/16
	1	1 1/16	69.5	4 1/4	2 11/16	1 11/16
	1	1 1/16	66.4	4 1/4	2 11/16	1 11/16
	1 1/16	1 1/16	71.2	4 5/8	2 11/16	1 11/16
	1 1/16	1 1/16	68.3	4 5/8	2 11/16	1 11/16
	1 1/16	1 1/16	65.7	4 5/8	2 11/16	1 11/16
	1 1/16	1 1/16	63.3	4 5/8	2 11/16	1 11/16
	1 1/4	1 5/16	70.8	5	2 7/8	1 11/16
	1 1/4	1 5/16	68.4	5	2 7/8	1 11/16
	1 1/4	1 5/16	66.1	5	2 7/8	1 11/16
	1 1/4	1 5/16	63.9	5	2 7/8	1 11/16
	1 1/4	1 5/16	62.0	5	2 7/8	1 11/16

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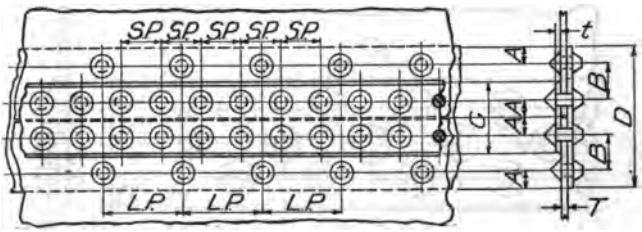
DOUBLE RIVETED BUTT JOINTS



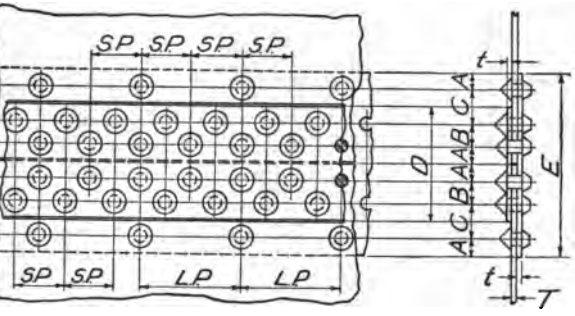
T. S.—55,000 pounds.
C. S.—95,000 pounds.

Single S. S.—42,000 pounds.
Double S. S.—78,000 pounds.

Thickness of Plate "T" Inches	Diameter of Cold Rivet Inches	Maximum Diameter of Rivet Hole Inches	Efficiency in Per Cent	Long Pitch of Rivets "L. P." Inches	Short Pitch of Rivets "S. P." Inches	Gauge "A" Inches	Space "B" Inches	Width of Outside Strap "C" Inches	Width of Inside Strap "D" Inches	Thickness of Straps "t" Inches
* 1/4	5/8	11/16	80.7	3 1/16	1 3/16	1 1/16	2 1/16	4 1/16	8 1/16	1/4
* 5/16	5/8	11/16	80.7	3 1/16	1 3/16	1 1/16	2 1/16	4 1/16	8 1/16	5/16
* 3/8	5/8	11/16	80.6	3 1/16	1 3/16	1 1/16	2 1/16	4 1/16	8	3/8
7/16	3/4	13/16	80.6	3 1/16	1 3/16	1 1/16	2 1/16	4 1/16	8	7/16
* 1/2	3/4	13/16	80.8	4 1/16	2 1/16	1 1/16	2 1/16	4 1/16	9 1/16	1/2
9/16	3/4	13/16	80.8	4 1/16	2 1/16	1 1/16	2 1/16	4 1/16	9 1/16	9/16
* 5/8	3/4	13/16	80.8	4 1/16	2 1/16	1 1/16	2 1/16	4 1/16	9 1/16	5/8
11/16	7/8	15/16	80.5	4 1/16	2 1/4	1 1/16	2 5/8	5 1/4	10 1/16	5/8
* 3/4	7/8	15/16	81.0	4 5/16	2 5/16	1 1/16	2 5/8	5 1/4	10 1/16	3/4
13/16	7/8	15/16	80.2	4 5/16	2 5/16	1 1/16	2 1/16	5 5/16	11 1/16	13/16
* 7/8	7/8	15/16	80.2	4 5/16	2 5/16	1 1/16	2 1/16	5 5/16	11 1/16	7/8
15/16	7/8	15/16	80.7	4 1/16	2 1/16	1 1/16	2 1/16	5 5/16	11 1/16	15/16
1	7/8	15/16	80.7	4 1/16	2 1/16	1 1/16	2 1/16	5 5/16	11 1/16	1
1 1/16	1	1 1/16	80.7	5 1/16	2 1/16	1 1/16	3 1/16	6 1/16	12 1/16	1 1/16
1 1/8	1	1 1/16	80.6	5 1/16	2 1/16	1 1/16	3 1/16	6 1/16	12 1/16	1 1/8
1 3/16	1	1 1/16	80.1	5 1/16	2 1/16	1 1/16	3 1/16	6 1/16	12 1/16	1 3/16
1 1/4	1	1 1/16	79.2	5 1/16	2 1/16	1 1/16	3 1/16	6 1/16	12 1/16	1 1/4
1 5/16	1	1 1/16	78.4	5 1/16	2 1/16	1 1/16	3 1/16	6 1/16	12 1/16	1 5/16
1 3/8	1 1/8	1 1/4	79.8	6 1/16	3 1/16	1 1/16	3 1/16	7 1/16	14 1/16	1 3/8
1 7/16	1 1/8	1 1/4	79.1	6 1/16	3 1/16	1 1/16	3 1/16	7 1/16	14 1/16	1 7/16
1 1/2	1 1/4	1 7/16	78.5	6 1/16	3 1/16	1 1/16	3 1/16	7 1/16	14 1/16	1 1/2
1 9/16	1 1/4	1 7/16	79.4	6 1/16	3 1/16	1 1/16	3 1/16	7 1/16	15 1/16	1 9/16
1 5/8	1 1/4	1 7/16	78.8	6 1/16	3 1/16	1 1/16	3 1/16	7 1/16	15 1/16	1 5/8
1 11/16	1 1/4	1 7/16	78.2	6 1/16	3 1/16	1 1/16	3 1/16	7 1/16	15 1/16	1 11/16
	1 1/4	1 7/16	76.2	6 1/16	3 1/16	1 1/16	3 1/16	7 1/16	15 1/16	1 3/4
	1 1/4	1 7/16	73.8	6 1/16	3 1/16	1 1/16	3 1/16	7 1/16	15 1/16	1 13/16
	1 1/4	1 7/16	71.4	6 1/16	3 1/16	1 1/16	3 1/16	7 1/16	15 1/16	1 7/8

Recommended by Hartford Stm. Blr. Insp. and Ins. Co.

TRIPLE RIVETED BUTT JOINTS



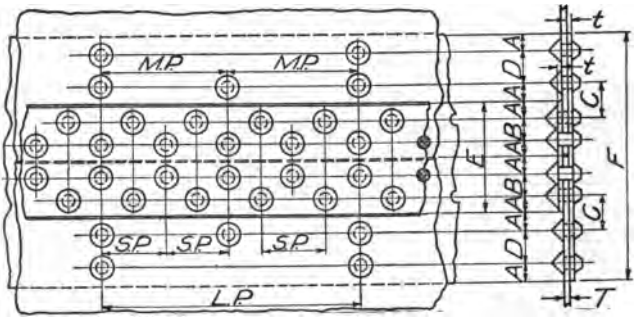
-55,000 pounds.
-95,000 pounds.

Single S. S.—42,000 pounds.
Double S. S.—78,000 pounds.

Diameter of Cold Rivet Inches	Maximum Diameter of Rivet Hole Inches	Efficiency in Per Cent	Long Pitch "L. P." Inches	Short Pitch "S. P." Inches	Gauge "A" Inches	Space "B" Inches	Space "C" Inches	Width of Outside Strap "D" Inches	Width of Inside Strap "E" Inches	Thickness of Straps "t" Inches
½	⅝	87.5	4½	2¼	1¼	1⅜	1¼	6⅛	9½	⅜
⅝	¹³⁄₁₆	87.5	4½	2¼	1¼	1⅝	1¼	6⅛	9½	⅜
⅝	¹³⁄₁₆	86.3	4⅛	2⅛	1¼	1⅝	1⅛	6½	10¼	⅜
¾	⅞	88.0	6¼	3⅛	1⅛	1⅛	2¼	8¼	12¾	¼
¾	⅞	88.0	6¼	3⅛	1½	1⅞	2¼	8¼	12¾	¼
¾	⅞	87.5	6½	3¼	1½	2	2⅛	8½	13¼	⅜
¾	⅞	87.7	6⅝	3⅛	1½	2	2⅛	8⅝	13¾	⅜
⅞	1	86.1	6¾	3⅜	1⅝	2⅛	2⅛	9⅛	15⅛	⅜
⅞	1	86.6	7	3½	1⅝	2⅛	2⅛	9⅞	15½	⅜
1	1⅛	85.8	7½	3¾	1⅝	2¼	3⅛	10⅛	17¼	⅜
1	1⅛	85.8	7½	3¾	1⅝	2¼	3⅛	10⅛	17¼	⅜
1	1⅛	85.9	7⅛	3⅜	1⅝	2⅛	3⅛	10⅛	17⅛	⅜
1	1⅛	86.0	7⅝	3⅛	1⅝	2⅛	3⅛	10⅛	17⅛	⅜
1	1⅛	86.3	7¾	3⅞	1⅝	2⅛	3⅛	11	17⅝	⅜
1	1⅛	85.8	7¾	3⅞	1⅝	2⅛	3⅛	11	17⅝	½
1⅛	1⅛	84.7	7¾	3⅞	1⅝	2⅛	3⅛	11¼	18⅛	⅜
1⅛	1⅛	84.5	7¾	3⅞	1⅝	2⅛	3⅛	11¼	18⅛	⅜
1⅛	1⅛	84.1	7⅞	3⅛	1⅝	2⅛	3⅛	11⅜	19	⅜
1⅛	1⅛	83.6	7⅞	3⅛	1⅝	2⅛	3⅛	11⅜	19	⅜
1¼	1⅛	82.8	7⅞	3⅛	1⅝	2⅛	3⅛	12⅛	20½	⅜
1¼	1⅛	82.2	7⅞	3⅛	1⅝	2⅛	3⅛	12⅛	20½	⅝
1¼	1⅛	82.5	8¼	4⅛	1⅝	2⅛	3⅛	12⅛	20¾	⅜
1¼	1⅛	82.0	8¼	4⅛	1⅝	2⅛	3⅛	12⅛	20¾	⅜
1⅜	1⅛	81.7	8½	4¼	2⅛	2⅛	4⅛	13¼	22⅝	⅜
1⅜	1⅛	81.5	8⅝	4⅛	2⅛	2⅛	4⅛	13⅛	22½	¾
1⅜	1⅛	81.0	8⅝	4⅛	2⅛	2⅛	4⅛	13⅞	22½	⅜
1⅜	1⅛	80.6	8⅝	4⅛	2⅛	2⅛	4⅛	13⅞	22½	⅜
1⅜	1⅛	80.1	8⅝	4⅛	2⅛	2⅛	4⅛	13⅞	22½	⅜
1⅜	1⅛	80.0	8¾	4⅜	2⅛	2⅛	4⅛	13⅞	22½	⅜
1½	1⅛	79.1	8¾	4⅜	2⅛	2⅛	4⅛	14¾	24½	⅜

TE.—All but Items marked (*) Designed and Recommended by Hartford Stm. Blr. and Ins. Co.

QUADRUPLE RIVETED BUTT JOINTS



T. S.—55,000 lbs. C. S.—95,000 lbs. Single S. S.—42,000 lbs. Double S. S.—78,000 lbs.

Thickness of Plate "T" Inches	Diameter of Cold Rivet Inches	Maximum Diameter of Rivet Hole Inches	Efficiency in Per Cent	Long Pitch "L. P." Inches	Middle Pitch "M. P." Inches	Short Pitch "S. P." Inches	Gauge "A" Inches	Space "B" Inches	Space "C" Inches	Space "D" Inches	Width of Outside Strap "E" Inches	Width of Inside Strap "F" Inches	Thickness of Straps "t" Inches
1/4	1/2	9/16	94.3	10	5	2 1/16	2 1/16	1 11/16	1 11/16	1 5/16	6 3/4	13 3/16	5/16
* 5/16	9/16	5/8	94.3	10	5	2 1/16	2 1/16	1 11/16	1 11/16	1 5/16	6 3/4	13 3/16	5/16
3/8	5/8	11/16	94.3	11	5 1/2	2 3/4	2 3/16	1 13/16	1 13/16	1 3/4	7 3/8	14 5/8	3/8
7/16	11/16	3/4	94.6	14	7	3 1/16	2 5/8	2 1/4	2		8 3/4	17 1/4	7/16
1/2	3/4	13/16	94.2	14	7	3 1/2	2 5/8	2 1/4	2		8 3/4	17 1/4	1/2
9/16	13/16	7/8	93.3	14	7	3 1/2	2 5/8	2 1/4	2		8 3/4	17 1/4	9/16
* 5/8	7/8	15/16	94.3	14 3/16	7 1/16	3 1/16	2 7/16	2 7/16	2 1/16		9 1/8	18 1/4	5/8
11/16	15/16	1	94.0	14 5/8	7 1/16	3 1/16	2 7/16	2 7/16	2 1/4		9 5/8	19 3/16	11/16
* 3/4	1	1 1/16	94.1	15	7 1/16	3 3/16	2 7/16	2 7/16	2 1/4		9 3/4	19 1/2	3/4
13/16	1 1/16	1 1/8	94.0	15 5/8	7 1/16	3 3/16	2 7/16	2 7/16	2 5/16		10 1/16	20 1/16	13/16
7/8	1 1/16	1 1/8	94.0	15 5/8	7 1/16	3 3/16	2 7/16	2 7/16	2 5/16		10 1/16	20 1/16	7/8
15/16	1 1/16	1 1/8	94.0	15 5/8	7 1/16	3 3/16	2 7/16	2 7/16	2 5/16		10 1/16	20 1/16	15/16
1	1 1/16	1 1/8	94.0	15 5/8	7 1/16	3 3/16	2 7/16	2 7/16	2 5/16		10 1/16	20 1/16	1
1	1 1/16	1 1/8	93.1	15 1/2	7 3/4	3 7/16	2 7/8	3 1/16	2 5/8	11		22 5/8	
1	1 1/16	1 1/8	93.1	15 1/2	7 3/4	3 7/16	2 7/8	3 1/16	2 5/8	11		22 5/8	
1	1 1/16	1 1/8	92.5	15 1/2	7 3/4	3 7/16	2 7/8	3 1/16	2 5/8	11		22 5/8	
1 1/16	1 1/16	1 1/8	92.4	15 5/8	7 13/16	3 7/16	2 7/8	3 1/16	2 7/8	11 1/16		24 1/16	
1 1/16	1 1/16	1 1/8	92.1	15 1/2	7 3/4	3 7/8	2 7/8	3 1/16	2 7/8	11 3/4		24 5/8	
1 1/16	1 1/16	1 1/8	91.1	15 1/2	7 3/4	3 7/8	2 7/8	3 1/16	2 7/8	11 3/4		24 5/8	
1 1/8	1 1/16	1 1/8	90.3	15 1/2	7 3/4	3 7/8	2 7/8	3 1/16	2 7/8	11 3/4		24 5/8	
1 1/4	1 1/16	1 1/8	90.8	15 5/8	7 13/16	3 7/8	2 7/8	3 1/16	2 7/8	12 1/16		26 1/16	
1 1/4	1 1/16	1 1/8	89.9	15 5/8	7 13/16	3 7/8	2 7/8	3 1/16	2 7/8	12 1/16		26 1/16	
1 1/4	1 1/16	1 1/8	89.1	15 3/4	7 7/8	3 7/8	2 7/8	3 1/16	2 7/8	12 1/8		26 1/4	
1 1/4	1 1/16	1 1/8	88.3	15 3/4	7 7/8	3 7/8	2 7/8	3 1/16	2 7/8	12 1/8		26 1/4	
1 1/4	1 1/16	1 1/8	87.8	16	8	4	2 7/8	3 1/16	2 7/8	12 1/16		26 1/16	
1 1/4	1 1/16	1 1/8	87.1	16	8	4	2 7/8	3 1/16	2 7/8	12 1/16		26 1/16	
1	1 3/8	1 7/16	87.3	16	8	4	2 15/16	4 1/16	3 3/8	13 1/16		28 1/16	
1 1/16	1 3/8	1 7/16	86.5	16	8	4	2 15/16	4 1/16	3 3/8	13 1/16		28 1/16	
1 1/16	1 3/8	1 7/16	86.3	16 1/16	8 1/16	4 1/16	2 15/16	4 1/16	3 3/8	13 1/16		28 1/16	
1 1/8	1 3/8	1 7/16	85.9	16 3/16	8 1/8	4 1/16	2 15/16	4 1/16	3 3/8	13 1/8		29	
1 1/8	1 3/8	1 7/16	85.4	16 3/16	8 1/8	4 1/16	2 15/16	4 1/16	3 3/8	13 1/8		29	
1 1/16	1 3/8	1 7/16	84.8	16 3/16	8 1/8	4 1/16	2 15/16	4 1/16	3 3/8	13 1/8		29	
1 1/16	1 3/8	1 7/16	84.5	17	8 1/2	4 1/4	2 15/16	4 1/16	3 3/8	13 3/4		29 1/16	
1 1/16	1 1/2	1 9/16	84.4	17	8 1/2	4 1/4	2 15/16	4 1/16	3 5/8	14 1/2		31 1/8	
1 1/4	1 1/2	1 9/16	84.0	17 1/8	8 9/16	4 5/16	2 15/16	4 1/16	3 5/8	14 1/2		31 1/8	

NOTE.—All but Items marked (*) Designed and Recommended by Hartford Stm. Blr. Insp. and Ins. Co.

Inside Diam.	Thickness																					
	¼	9/32	5/16	11/32	3/8	13/32	7/16	15/32	½	17/32	9/16	19/32	5/8	21/32	11/16	23/32	¾	25/32	13/16	27/32	7/8
24	1146	1289	1432	1575	1718	1861	2005	2148	2292	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	1058	1190	1322	1452	1587	1718	1850	1984	2117	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	982	1104	1228	1350	1473	1596	1718	1841	1965	2086	2209	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	916	1030	1146	1260	1375	1489	1602	1718	1833	1947	2061	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
32	859	967	1074	1181	1289	1397	1502	1611	1719	1827	1934	2041	2148	.....	.....	.....	.....	.....	.....	.....	.....
34	809	910	1011	1111	1213	1314	1415	1517	1618	1718	1820	1921	2022	.....	.....	.....	.....	.....	.....	.....	.....
36	764	859	955	1050	1146	1241	1336	1432	1528	1623	1718	1814	1910	2004	2100	.....	.....	.....	.....	.....	.....
38	723	814	904	995	1085	1176	1266	1358	1446	1539	1629	1718	1808	1900	1990	.....	.....	.....	.....	.....	.....
40	687	773	859	945	1031	1117	1203	1290	1374	1460	1547	1633	1718	1805	1890	1975	2062	.....	.....	.....	.....
42	654	736	818	900	982	1067	1146	1228	1308	1391	1472	1556	1636	1718	1800	1882	1964	.....	.....	.....	.....
44	625	703	781	859	937	1015	1094	1171	1250	1328	1406	1485	1562	1640	1718	1796	1874	1952	2030	.....	.....
46	598	672	747	822	897	971	1046	1121	1196	1270	1344	1420	1494	1569	1644	1718	1794	1868	1942	.....	.....
48	573	644	716	788	859	931	1001	1073	1146	1218	1288	1361	1432	1503	1575	1647	1718	1790	1862	1933	2002
50	550	619	687	756	825	894	962	1031	1100	1169	1238	1307	1374	1444	1512	1581	1650	1718	1788	1856	1924
52	529	595	661	727	793	859	925	992	1058	1123	1190	1257	1322	1389	1453	1520	1586	1652	1718	1785	1850
54	509	573	636	700	764	827	891	955	1019	1082	1146	1210	1272	1338	1400	1464	1528	1591	1654	1718	1782
60	458	516	573	630	687	745	802	859	917	974	1032	1089	1146	1202	1260	1318	1375	1431	1490	1547	1603
66	417	469	521	573	625	677	729	782	834	886	938	990	1042	1093	1146	1198	1250	1301	1354	1407	1458
72	382	430	477	525	573	621	668	716	764	812	860	907	954	1002	1050	1098	1146	1193	1242	1290	1336
78	352	397	441	484	529	573	617	661	703	749	794	838	882	926	968	1013	1058	1101	1146	1190	1234
84	327	368	409	450	491	532	573	614	655	696	736	778	818	860	900	941	982	1022	1064	1105	1146
90	305	344	382	420	459	496	535	573	611	650	685	726	764	802	840	879	917	955	993	1031	1070
96	286	322	358	394	430	465	501	537	573	609	645	681	716	752	788	824	859	895	931	968	1002
102	270	303	337	371	405	438	472	506	539	573	607	641	674	708	742	775	810	843	876	910	944
108	254	287	318	350	382	414	445	478	509	541	573	605	636	669	700	732	764	796	827	860	891
114	241	272	302	332	362	392	422	453	483	513	543	573	603	634	664	694	724	754	784	814	844
120	229	258	286	315	344	372	401	430	458	487	516	545	573	602	630	659	687	716	745	774	802
126	218	246	273	300	328	355	382	409	436	464	491	518	546	573	600	628	655	683	710	737	764
132	208	234	260	287	312	339	365	391	417	443	469	495	521	547	573	599	625	651	677	704	729
138	199	224	249	274	299	324	349	374	398	424	449	474	498	524	548	573	598	623	648	673	698
144	191	215	239	262	287	310	334	358	382	406	430	454	478	501	525	549	573	597	621	645	668

The safe working pressure is found by dividing the above bursting pressures by the factor of safety and multiplying the quotient by the efficiency of the longitudinal joint. Example: Shell 60″ diam. × ½″ thick, factor of safety 4, single riveted lap joint efficiency .584.

$\frac{917}{4} \times .584 = 125$ lbs.

GALLONS IN CYLINDRICAL TANKS

Depth in Feet	Diameters in Feet																
	5	6	7	8	9	10	12	14	16	18	20	25	30	35	40	45	50
1	147	212	288	376	476	588	846	1152	1504	1904	2350	3672	5288	7197	9400	11897	14688
5	734	1058	1439	1880	2379	2938	4230	5758	7520	9518	11751	18360	26438	35986	47001	59486	73440
6	881	1269	1727	2256	2855	3525	5076	6909	9025	11422	14101	22032	31726	43183	56402	71383	88128
7	1028	1481	2015	2632	3331	4113	5922	8061	10529	13325	16451	25704	37014	50380	65802	83281	102816
8	1175	1692	2303	3008	3807	4700	6768	9212	12033	15229	18801	29376	42301	57577	75202	95178	117504
9	1322	1904	2591	3384	4283	5288	7614	10364	13537	17132	21151	33048	47589	64774	84603	107075	132192
10	1469	2115	2879	3760	4759	5875	8460	11515	15041	19036	23501	36720	52877	71971	94003	119972	146880
12	1762	2538	3455	4512	5711	7050	10152	13818	18049	22843	28201	44064	63452	86365	112803	142767	176256
14	2056	2961	4030	5264	6662	8225	11844	16121	21033	26650	32901	51408	74027	100759	131604	166561	205631
16	2350	3384	4606	6016	7614	9400	13536	18424	24066	30458	37602	58752	84603	115154	150405	190356	235007
18	2644	3807	5182	6768	8566	10575	15228	20727	27074	34265	42302	66096	95178	129548	169205	214150	264383
20	2938	4230	5758	7520	9518	11750	16921	23030	30082	38072	47002	73440	105753	143942	188006	237945	293759
25	3672	5288	7197	9400	11897	14688	21151	28788	37603	47590	58753	91800	132192	179928	235007	297431	367199
30	4406	6345	8636	11280	14277	17626	25381	34545	45123	57108	70503	110160	158630	215913	282009	356917	440639
35	5141	7403	10076	13160	16656	20563	29611	40303	52643	66626	82254	128520	185068	251899	329010	416404	514079
40	5875	8460	11515	15040	19036	23501	33841	46060	60164	76144	94004	146880	211507	287884	376012	475890	587518
45	6610	9518	12955	16920	21415	26440	38071	51818	67685	85662	105755	165239	237945	323870	423013	535376	660958
50	7344	10576	14394	18800	23794	29376	42301	57575	75205	95180	117505	183600	264383	359855	470015	594862	734398
60	8813	12691	17273	22561	28553	35251	50762	69090	90246	114216	141006	220319	317260	431826	564017	713835	881278
70	10283	14806	20152	26321	33312	41126	59222	80605	105287	133252	164507	257039	370137	503797	658020	832807	1028157
80	11750	16921	23031	30081	38071	47002	67682	92120	120328	152288	188008	293759	423013	575768	752024	951780	1175037
90	13219	19036	25909	33841	42830	52877	76143	103635	135369	171324	211509	330479	475890	647739	846027	1070752	1321916
100	14688	21151	28788	37601	47589	58752	84603	115150	150410	190360	235010	367199	528767	719710	940030	1189725	1468796

$$1\ \text{Gallon} = 231\ \text{cu. in.} = \frac{1\ \text{cu. ft.}}{7.4805} = 0.13368\ \text{cu. ft.}$$

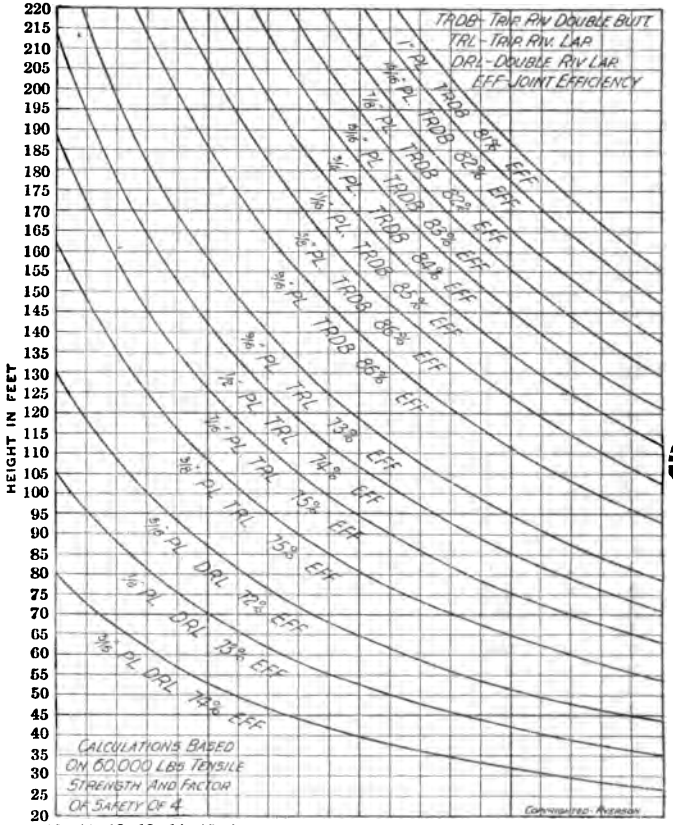
ENGTH OF BOLTS, STAYS AND SUSPENSION RODS AT REDUCED AREA

Diam. at Root of Thread	Area at Root of Thread	No. of Thread per Inch	Unit Stress per Square Inch						
			6000 Lbs.	7000 Lbs.	7500 Lbs.	8000 Lbs.	9000 Lbs.	10000 Lbs.	12000 Lbs.
.185	.0269	20	161	188	201	215	242	269	322
.240	.0452	18	271	316	339	361	406	452	542
.294	.0678	16	406	474	508	542	610	678	813
.344	.0930	14	558	651	697	744	837	930	1116
.400	.1257	13	754	879	943	1005	1131	1257	1508
.454	.1619	12	971	1133	1214	1295	1457	1619	1942
.507	.2019	11	1211	1413	1514	1615	1817	2019	2422
.620	.3019	10	1811	2113	2264	2415	2717	3019	3622
.731	.4197	9	2518	2937	3147	3357	3777	4197	5036
.837	.5502	8	3301	3851	4126	4401	4951	5502	6602
.940	.6940	7	4164	4858	5205	5552	6246	6940	8328
1.065	.8908	7	5344	6235	6681	7126	8017	8908	10689
1.160	1.0568	6	6340	7397	7926	8454	9511	10568	12681
1.284	1.2950	6	7770	9065	9712	10360	11655	12950	15540
1.389	1.5152	5½	9091	10606	11364	12121	13636	15152	18182
1.491	1.7460	5	10476	12222	13095	13968	15714	17460	20952
1.616	2.0510	5	12306	14357	15380	16408	18459	20510	24612
1.712	2.3020	4½	13812	16114	17265	18416	20718	23020	27622
1.962	3.0235	4½	18141	21164	22676	24188	27211	30235	36284
2.176	3.7187	4	22312	26030	27890	29749	33468	37187	44622
2.426	4.6225	4	27735	32357	34668	36980	41602	46225	55474
2.629	5.4284	3½	32570	37998	40713	43427	48855	54284	65140
2.879	6.5099	3½	39059	45569	48824	52079	58589	65099	78110
3.100	7.5477	3¼	45286	52833	56607	60381	67929	75477	90578
3.317	8.6413	3	51847	60489	64809	69130	77771	86413	103692
3.567	9.9930	3	59958	69957	74947	79944	89937	99930	119915
3.798	11.3292	2⅞	67975	79304	84969	90633	101963	113292	135956
4.028	12.7429	2¾	76457	89200	95571	101943	114686	127429	152910
4.256	14.2264	2⅝	85358	99584	106698	113811	128037	142264	170714
4.480	15.7633	2½	94579	110343	118224	126106	141869	157633	189156
4.730	17.5717	2½	105430	123002	131787	140574	158145	175717	210869
4.953	19.2676	2⅜	115605	134873	144707	154141	173408	192676	231210
5.203	21.2617	2⅜	127570	148831	159462	170093	191355	212617	255141
5.423	23.0977	2¼	138586	161683	173232	184781	207879	230977	277170

above table is based on U. S. Standard Threads.
list of nuts and bolts in stock, see Section 5.

STANDPIPE PROPORTIONS

THICKNESS OF METAL AND STYLE OF VERTICAL JOINTS FOR DIFFERENT DIAMETERS AND HEIGHTS


TRDB-TRIP. RIV. DOUBLE BUTT
TRL-TRIP. RIV. LAP
DRL-DOUBLE RIV. LAP
EFF-JOINT EFFICIENCY
1" PL TRDB 82% EFF
15/16" PL TRDB 82% EFF
7/8" PL TRDB 83% EFF
3/4" PL TRDB 84% EFF
11/16" PL TRDB 85% EFF
5/8" PL TRDB 86% EFF
9/16" PL TRDB 86% EFF
1/2" PL TRL 73% EFF
7/16" PL TRL 74% EFF
3/8" PL TRL 75% EFF
5/16" PL DRL 72% EFF
1/4" PL DRL 73% EFF
3/16" PL DRL 74% EFF
CALCULATIONS BASED ON 60,000 LBS TENSILE STRENGTH AND FACTOR OF SAFETY OF 4
COMPUTED: PITTSBURGH
HEIGHT IN FEET
DIAMETER OF STANDPIPE IN FEET

NOTE.—Thickness of bottom of standpipe to be not less than two-thirds thickness of first course, with joints single riveted.

EXAMPLE: A standpipe of 20 feet diameter by 140 feet in height would have $\frac{9}{16}$ inch plate, with vertical joints (butt strapped and triple riveted) for the lower 20 feet. The next 15 feet would be $\frac{1}{2}$ inch plate, with triple riveted lap joints, followed by 10 feet of $\frac{7}{16}$ inch, 15 feet of $\frac{3}{8}$ inch, etc.

See page 1201 for details of riveted joints, page 1211 for estimated weights of standpipes.

EIGHTS OF STANDPIPES FOR DIFFERENT DIAMETERS AND HEIGHTS

IN TONS OF 2,000 POUNDS

	Inside Diameter in Feet									
10	11	12	13	14	15	16	17	18	19	
3.41	3.74	4.10	4.49	4.87	5.28	5.65	6.04	6.44	6.89	
4.12	4.52	4.94	5.40	5.84	6.33	6.76	7.21	7.68	8.20	
4.83	5.29	5.78	6.30	6.82	7.37	7.87	8.38	8.91	9.51	
5.54	6.06	6.61	7.21	7.78	8.42	8.97	9.55	10.15	10.82	
6.25	6.83	7.45	8.11	8.76	9.46	10.08	10.72	11.38	12.13	
6.96	7.61	8.29	9.02	9.73	10.51	11.19	11.89	13.13	13.99	
7.67	8.38	9.13	9.92	10.71	11.55	12.30	13.55	14.88	15.84	
8.38	9.15	9.96	10.83	11.68	13.02	13.86	15.20	16.62	17.70	
9.09	9.93	10.80	11.73	13.04	14.49	15.43	16.86	18.99	20.23	
9.80	10.70	11.64	13.00	14.41	15.96	16.99	19.09	21.12	22.49	
0.51	11.47	12.82	14.27	15.77	17.43	19.09	21.11	23.25	25.66	
1.22	12.56	14.00	15.54	17.14	19.39	20.99	23.13	26.23	28.52	
1.93	13.65	15.18	16.81	18.96	21.19	22.90	25.94	28.92	31.38	
2.93	14.74	16.36	18.49	20.62	22.98	25.55	28.49	31.61	34.24	
3.92	15.82	17.91	20.04	22.28	25.46	27.96	31.04	34.30	38.08	
4.92	16.91	19.35	21.59	24.56	27.73	30.37	33.59	37.86	41.48	
5.91	18.33	20.78	23.14	26.66	30.00	32.78	36.96	41.03	45.03	
6.91	19.65	22.22	25.27	28.76	32.27	35.94	39.97	44.20	48.86	
8.20	20.98	24.18	27.23	30.86	35.24	38.79	42.98	47.94	52.69	
9.41	22.30	26.00	29.19	32.96	37.93	41.64	46.51	51.52	57.43	
0.90	24.10	27.82	31.15	35.66	40.62	44.98	49.92	55.95	61.81	
1.80	25.78	29.64	33.11	38.13	43.31	48.22	53.32	60.05	66.19	
3.00	27.46	31.46	35.63	40.59	46.45	51.43	57.51	64.15	71.25	
4.68	29.14	33.28	37.93	43.06	49.50	55.38	61.40	68.76	76.31	
6.27	30.82	35.60	40.24	45.93	52.54	59.07	65.29	73.38	81.37	
7.76	32.50	37.75	42.54	48.72	56.26	62.75	69.68	77.99	86.43	
9.30	34.65	39.89	45.23	51.50	59.73	66.92	74.07	82.61	92.27	
0.84	36.63	42.04	47.83	54.91	63.21	71.09	78.46	87.22	97.73	
2.38	38.62	44.54	50.44	58.10	67.16	75.26	82.85	92.63	103.18	
4.34	40.60	46.97	53.04	61.29	71.10	79.43	87.55	97.68	109.67	
6.17	42.59	49.39	56.21	64.48	75.05	83.60	92.36	102.74	115.95	
7.99	44.89	51.82	59.20	68.08	79.00	89.05	97.17	108.74	122.23	
9.82	47.14	54.76	62.18	71.67	82.95	92.61	101.98	114.55	129.29	
1.64	49.38	57.54	65.55	75.27	86.89	97.18	107.69	120.36	136.09	
3.76	51.63	60.31	68.93	78.86	91.45	101.74	113.23	126.88	142.89	
5.82	53.97	63.09	72.30	82.46	95.77	107.16	118.77	133.16	150.90	
7.89	56.58	66.24	75.68	86.26	100.09	112.43	124.97	139.44	158.51	
9.95	59.15	69.39	79.05	90.19	104.41	117.70	130.95	146.80	166.13	
2.02	61.71	72.55	82.43	94.11	109.49	122.96	136.93	153.81	174.64	
4.51	64.28	75.70	86.29	98.03	114.49	128.83	143.92	160.82	182.76	
6.87	67.21	78.85	89.96	101.90	119.49	134.50	150.60	168.64	191.37	

s.—Weights are approximate, and are calculated according to taken from curves on page 1210. All courses figured five (5) gh. Weights include laps, necessary rivets, top and bottom and ladder, but do not include cover, or anchor bolts and

B 67
ved.
ped below.

WEIGHTS OF STANDPIPES FOR DIFFERENT DIAMETERS AND HEIGHTS

CONTINUED

IN TONS OF 2,000 POUNDS

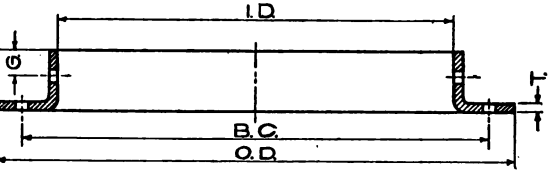
Height in Feet	Inside Diameter in Feet										
	20	21	22	23	24	25	26	27	28	29	30
20	7.30	8.09	8.53	8.99	9.46	9.92	10.40	10.89	11.37	11.89	12.39
25	8.68	9.53	10.04	10.56	11.10	11.63	12.17	12.73	13.27	13.86	14.43
30	10.05	10.97	11.54	12.13	12.74	13.33	13.94	14.56	15.97	16.67	17.33
35	11.43	12.41	13.05	13.70	15.07	15.75	16.45	17.17	18.66	19.48	20.23
40	12.80	14.45	15.18	15.93	17.40	18.17	18.96	20.77	22.41	23.76	24.66
45	14.75	16.49	17.31	18.15	20.57	21.50	22.43	23.95	25.70	27.54	29.64
50	16.70	18.53	20.21	21.18	23.41	24.45	25.50	28.37	30.30	32.35	33.96
55	19.36	21.28	22.81	23.89	27.32	28.52	29.74	32.25	34.31	36.53	40.20
60	21.73	23.76	26.32	27.57	30.80	32.13	33.48	36.13	40.07	42.53	45.36
65	24.10	27.12	29.48	30.86	34.27	35.73	38.80	41.66	44.89	47.53	51.53
70	27.34	30.14	32.63	34.15	39.14	40.83	43.30	46.32	50.59	53.48	57.29
75	30.22	33.16	36.98	38.74	43.30	45.16	48.61	51.82	55.94	60.58	64.63
80	33.11	37.31	40.74	42.66	48.20	50.26	53.60	58.36	62.73	66.94	72.43
85	37.02	40.91	44.50	47.32	52.83	55.07	59.87	64.24	68.82	74.52	80.23
90	40.46	44.50	48.98	51.73	58.64	61.12	65.56	71.23	76.03	82.10	88.03
95	43.89	48.77	53.20	57.22	63.92	66.60	72.33	78.22	83.25	89.68	97.56
100	47.94	52.82	58.46	62.24	70.25	73.15	79.10	85.21	90.46	98.91	106.01
105	51.81	57.85	63.27	68.19	76.57	79.69	85.87	93.67	99.22	107.12	116.08
110	56.62	62.46	69.00	74.14	82.90	86.24	94.03	101.24	107.03	116.87	125.73
115	61.03	67.97	74.73	80.07	89.22	94.08	101.36	108.81	116.31	126.26	137.06
120	66.32	73.47	80.45	86.04	96.77	101.16	108.89	117.78	125.22	137.25	147.61
125	71.60	78.98	86.18	93.13	103.60	109.55	117.37	126.42	135.64	147.50	160.54
130	76.89	84.48	92.97	99.57	111.70	117.66	125.74	136.49	145.37	160.01	173.45
135	82.17	90.97	99.16	106.00	119.54	125.76	135.47	145.92	157.21	173.33	186.13
140	87.46	96.91	105.35	113.61	127.37	135.15	144.40	157.38	169.83	185.65	199.64
145	93.59	102.86	112.68	120.97	136.41	143.98	155.64	169.57	181.50	198.77	213.03
150	99.29	109.90	119.77	129.47	144.93	154.65	165.87	180.88	193.94	211.78	229.00
155	106.03	116.72	127.91	137.47	155.21	164.54	177.65	192.94	206.28	227.26	243.91
160	112.58	123.54	135.61	147.07	164.77	175.87	188.68	204.90	220.91	241.75	.....
165	119.13	131.35	143.31	156.03	175.09	186.45	200.26	218.96	234.62	.....	.....
170	126.53	138.75	152.54	165.64	185.91	197.83	211.83	232.33	.....	.....	.....
175	133.63	147.58	161.16	175.22	196.81	208.92	225.49	.....	.....	.....	.....
180	140.73	155.87	170.97	184.80	207.62	222.10	238.35	.....	.....	.....	.....
185	149.10	164.15	180.18	195.02	218.43	234.54	.....	.....	.....	.....	.....
190	157.05	173.55	190.02	205.16	231.14	.....	.....	.....	.....	.....	.....
195	165.00	182.40	199.77	217.04	243.15	.....	.....	.....	.....	.....	.....
200	173.91	191.85	209.53	228.28	.....	.....	.....	.....	.....	.....	.....
205	182.40	201.22	220.93	.....	.....	.....	.....	.....	.....	.....	.....
210	191.39	210.59	231.75	.....	.....	.....	.....	.....	.....	.....	.....
215	200.37	221.51	.....	.....	.....	.....	.....	.....	.....	.....	.....
220	209.36	231.90	.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE.—Weights are approximate, and are calculated according to design taken from curves on page 1210. All courses figured five (5) feet high. Weights include laps, necessary rivets, top and bottom angles and ladder, but do not include cover, or anchor bolts and lugs.

SIZES AND SPACING OF RIVETS FOR
FORGED STEEL BOILER FLANGES
ACCORDING TO ORDINARY PRACTICE

Outside Diameter Inches	Thickness Inches	Diameter of Rivet Inches	Diameter of Rivet Circle	Number of Rivets	Pitch of Rivet	Diameter of Rivet Inches	Diameter of Rivet Circle	Number of Rivets	Pitch of Rivet
6	5/16	1/2	4 5/16	8	1 11/16	5/8	3 15/16	6	2 1/16
6	15/16	1/2	4 5/16	8	1 11/16	5/8	3 15/16	6	2 1/16
6 1/2	5/16	1/2	4 13/16	8	1 7/8	5/8	4 7/16	6	2 5/16
7	3/8	5/8	4 15/16	8	1 15/16	3/4	4 9/16	6	2 3/8
8	3/8	5/8	5 15/16	10	1 7/8	3/4	5 9/16	8	2 11/16
8 1/2	3/8	5/8	6 7/16	10	2 7/32	3/4	6 1/16	8	2 3/8
9	3/8	5/8	6 15/16	10	2 3/16	3/4	6 9/16	10	2 1/16
9 1/2	7/16	5/8	7 7/16	12	1 15/16	3/4	7 1/16	10	2 7/32
10	7/16	5/8	7 15/16	12	2 1/16	3/4	7 9/16	10	2 3/8
10 1/2	1/2	3/4	8 1/16	12	2 1/8	7/8	7 11/16	10	2 7/16
11 1/2	1/2	3/4	9 1/16	12	2 3/8	7/8	8 11/16	10	2 11/16
12 1/2	1/2	3/4	10 1/16	14	2 1/4	7/8	9 11/16	12	2 1/2
14	5/8	3/4	11 9/16	16	2 1/4	7/8	11 3/16	14	2 1/2
15	5/8	3/4	12 9/16	18	2 3/16	7/8	12 3/16	16	2 3/8
16	3/4	7/8	13 3/16	16	2 5/8	1	12 13/16	16	2 1/2
17 1/2	3/4	7/8	14 11/16	18	2 9/16	1	14 5/16	16	2 13/16
20	13/16	7/8	17 3/16	20	2 5/8	1	16 13/16	18	2 15/16

SIZES AND SPACING OF RIVETS AND BOLTS FOR
PRESSED STEEL PIPE FLANGES
ACCORDING TO ORDINARY PRACTICE



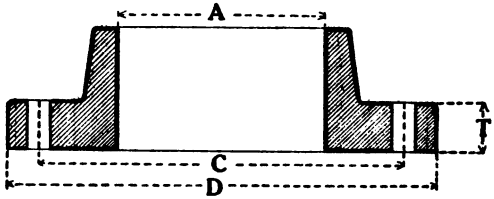
O. D.	T.	H.	B. C.	Bolts		Rivets		
				Size	No.	Size	No.	G.
16 1/4	3/8	2 1/2	14 3/4	1/2	16	5/8	20	1 1/8
18 1/4	3/8	2 1/2	16 3/4	1/2	18	5/8	22	1 1/8
20 1/4	3/8	2 1/2	18 3/4	1/2	20	5/8	24	1 1/8
22 7/8	7/16	2 3/4	21	5/8	22	3/4	24	1 1/4
24 7/8	7/16	2 3/4	23	5/8	24	3/4	28	1 1/4
26 7/8	7/16	2 3/4	25	5/8	26	3/4	30	1 1/4
29 3/4	1/2	3	27 1/2	3/4	28	7/8	30	1 3/8
31 3/4	1/2	3	29 1/2	3/4	30	7/8	32	1 3/8
33 3/4	1/2	3	31 1/2	3/4	32	7/8	36	1 3/8
35 3/4	1/2	3	33 1/3	3/4	34	7/8	38	1 3/8

Dimensions in inches.

STANDARDS FOR DRILLING PIPE FLANGES AND FITTINGS

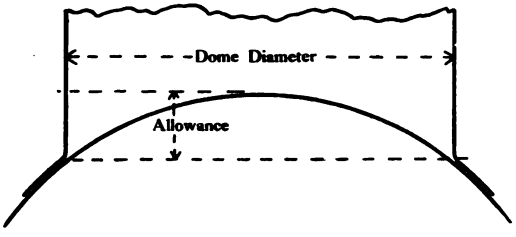
ACCORDING TO SCHEDULES ADOPTED

A. S. M. E. AUGUST, 1894
LEADING MANUFACTURERS, JUNE, 1901



A Pipe Size, Inches	D Diameter of Flange, Pressure			T Thickness of Flange, Pressure			C Bolt Circle Diameter, Pressure			Number Bolts, Pressure		Diameter of Bolts, Pressure			Length of Bolts, Pressure		
	Up to 75 Pounds	75 to 200 Pounds	200 to 250 Pounds	Up to 75 Pounds	75 to 200 Pounds	200 to 250 Pounds	Up to 75 Pounds	75 to 200 Pounds	200 to 250 Pounds	Up to 200 Pounds	250 Pounds	Up to 75 Pounds	75 to 200 Pounds	200 to 250 Pounds	Up to 75 Pounds	75 to 200 Pounds	200 to 250 Pounds
2	....	6	6½	....	5/8	7/8	....	4¾	5	4	4	½	5/8	5/8	....	2	2½
2½	....	7	7½	....	11/16	1	....	5½	5⅞	4	4	½	5/8	¾	....	2½	3
3	....	7½	8¼	....	¾	1⅛	....	6	6⅝	4	8	½	5/8	⅝	....	2½	3
3½	....	8½	9	....	13/16	1 1/16	....	7	7¼	4	8	½	5/8	⅝	....	2½	3¼
4	....	9	10	....	13/16	1¼	....	7½	7⅞	4	8	⅝	¾	¾	....	2¾	3½
4½	....	9¼	10½	....	13/16	1 3/16	....	7¾	8½	8	8	⅝	¾	¾	....	3	3½
5	....	10	11	....	13/16	1⅜	....	8½	9¼	8	8	5/8	¾	¾	....	3	3¾
6	....	11	12½	....	1	1 1/16	....	9½	10⅝	8	12	⅝	¾	¾	....	3	3¾
7	....	12½	14	....	1 1/16	1½	....	10¾	11⅞	8	12	⅝	¾	⅞	....	3¼	4
8	....	13½	15	....	1⅛	1⅝	....	11¾	13	8	12	⅝	¾	⅞	....	3½	4¼
9	....	15	16	....	1⅛	1¾	....	13¼	14	12	12	5/8	¾	⅞	....	3½	4½
10	....	16	17½	....	1 3/16	1⅞	....	14¼	15¼	12	16	¾	⅞	⅞	....	3⅝	4¾
12	....	19	20	....	1¼	2	....	17	17¾	12	16	¾	⅞	⅞	....	3¾	5
14	....	21	22½	....	1⅜	2⅛	....	18¾	20	12	20	⅞	1	⅞	3½	4¼	5¼
15	....	22¼	23½	....	1⅜	2 3/16	....	20	21	16	20	⅞	1	1	3¾	4¼	5½
16	....	23½	25	....	1 7/16	2¼	....	21¼	22½	16	20	⅞	1	1	3¾	4½	5¾
18	....	25	27	....	1 9/16	2⅜	....	22¾	24½	16	24	1	1⅛	1	4	4¾	6
20	....	27½	29½	....	1 11/16	2½	....	25	26¾	20	24	1	1⅛	1⅛	4¼	5	6¼
22	....	29½	31⅓	....	1 13/16	2⅝	....	27½	28⅝	20	28	1	1¼	1⅛	4¼	5⅛	6½
24	31½	32	34	1¼	1⅞	2¾	29¼	29½	31¼	20	28	1	1¼	1⅛	4¼	5½	6¾
26	33¾	34¼	36¼	1 5/16	2	....	31¼	31¾	33½	24	32	1	1¼	1⅛	4½	5¾	7
28	36	36½	38½	1⅜	2 1/16	....	33½	34	35¾	28	32	1	1¼	1⅛	4½	6	7¼
30	38	38¾	....	1½	2⅛	....	35½	36	....	28	....	1⅛	1⅜	....	4¾	6¼	....
36	44½	45¾	....	1¾	2⅜	....	42	42¾	....	32	....	1⅛	1⅜	....	5	6½	....
42	51	52¾	....	1 7/8	2⅝	....	48½	49⅛	....	36	....	1¼	1½	....	5¾	7¼	....
48	57½	59½	....	2	2¾	....	54¾	56	....	44	....	1⅜	1½	....	6¼	7¾	....

ALLOWANCE FOR DOME PLATES



following table gives the rise or versed sine (shown as "allow- in illustration) which should be added to the dome height ange width to determine width of sheet required. The allow- given are found by the formula $A = \sqrt{r^2 - \frac{c^2}{4}}$ in which "c" dome diameter or chord of the arc and "r" is one-half the liameter. Figures given are correct within one-thirty-second inch.

er he	Diameter of Shell in Inches												
	30	36	42	44	48	54	60	66	72	78	84	90	96
	3 13/16	3	2 1/2	2 3/8	2 3/16	....	....	....	....	....	....	....	....
	4 1/16	3 3/4	3 1/8	2 15/16	2 11/16	....	....	....	....	....	....	....	....
	6	4 9/16	3 3/4	3 9/16	3 1/4	2 13/16	....	....	....	....	....	....	....
	....	5 9/16	4 1/2	4 1/4	3 13/16	3 5/16	....	....	....	....	....	....	....
	.....	6 11/16	5 5/16	5	4 1/2	3 15/16	3 7/16	....	....	....	....	....	....
	....	....	6 5/16	5 15/16	5 1/4	4 9/16	4	3 5/8	3 1/4	....	....	....	....
	....	....	....	6 7/8	6 1/8	5 1/4	4 5/8	4 1/8	3 3/4	3 7/16	3 3/16	....	....
	....	....	....	....	7 1/16	6	5 1/4	4 11/16	4 1/4	3 15/16	3 5/8	3 5/16	....
	....	....	....	....	8 1/8	6 7/8	6	5 5/16	4 13/16	4 3/8	4 1/16	3 3/4	3 1/2
	....	....	....	....	....	7 13/16	6 13/16	6	5 7/16	4 15/16	4 9/16	4 3/16	3 15/16
	....	....	....	....	....	8 7/8	7 5/8	6 3/4	6 1/16	5 1/2	5 1/16	4 11/16	4 3/8
	....	....	....	....	....	....	8 9/16	7 9/16	6 3/4	6 1/8	5 5/8	5 3/16	4 13/16
	....	....	....	....	....	....	9 5/8	8 3/8	7 1/2	6 13/16	6 1/4	5 3/4	5 5/16
	....	....	....	....	....	....	....	9 5/16	8 5/16	7 1/2	6 7/8	6 5/16	5 7/8
	....	....	....	....	....	....	....	....	9 3/16	8 1/4	7 1/2	6 15/16	6 7/16

WATER PRESSURE

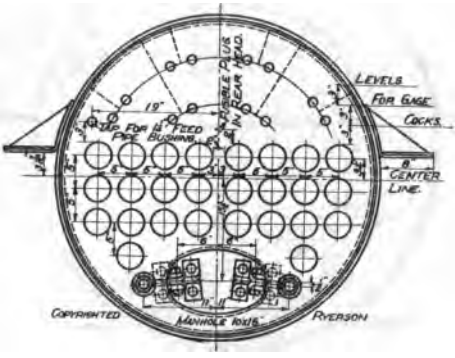
PRESSURE IN POUNDS PER SQUARE INCH FOR DIFFERENT HEADS OF WATER AT 62.5 POUNDS PER CUBIC FOOT

Head, Feet	0	1	2	3	4	5	6	7	8	9
0	0.00	.43	.87	1.30	1.74	2.17	2.60	3.04	3.47	3.91
10	4.34	4.77	5.21	5.64	6.08	6.51	6.94	7.38	7.81	8.25
20	8.68	9.12	9.55	9.98	10.42	10.85	11.28	11.72	12.15	12.59
30	13.02	13.46	13.89	14.32	14.76	15.19	15.63	16.06	16.49	16.93
40	17.36	17.80	18.22	18.66	19.10	19.53	19.97	20.40	20.83	21.27
50	21.70	22.35	22.57	23.03	23.44	23.87	24.31	24.74	25.17	25.61
60	26.04	26.48	26.91	27.34	27.78	28.21	28.65	29.08	29.51	29.95
70	30.38	30.82	31.25	31.68	32.12	32.55	32.99	33.42	33.85	34.29
80	34.72	35.16	35.59	36.02	36.46	36.89	37.33	37.76	38.19	38.63
90	39.06	39.50	39.93	40.36	40.80	41.32	41.67	42.10	42.53	42.97
100	43.40	43.84	44.27	44.71	45.14	45.57	46.01	46.44	46.88	47.31
110	47.74	48.18	48.61	49.05	49.48	49.91	50.35	50.78	51.22	51.65
120	52.08	52.52	52.95	53.39	53.82	54.25	54.69	55.12	55.56	55.99
130	56.42	56.86	57.29	57.73	58.16	58.59	59.03	59.46	59.90	60.33
140	60.76	61.20	61.63	62.07	62.50	62.93	63.37	63.80	64.24	64.67
150	65.10	65.54	65.97	66.41	66.84	67.27	67.71	68.14	68.58	69.01
160	69.44	69.88	70.31	70.75	71.18	71.61	72.05	72.48	72.92	73.35
170	73.79	74.22	74.65	75.09	75.52	75.96	76.39	76.82	77.26	77.69
180	78.13	78.56	78.99	79.43	79.86	80.30	80.73	81.16	81.60	82.03
190	82.47	82.90	83.33	83.77	84.20	84.64	85.07	85.50	85.94	86.37
200	86.81	87.24	87.67	88.11	88.54	88.98	89.41	89.84	90.28	90.71
210	91.15	91.58	92.01	92.45	92.88	93.32	93.75	94.18	94.62	95.05
220	95.49	95.92	96.35	96.79	97.22	97.66	98.09	98.52	98.96	99.39

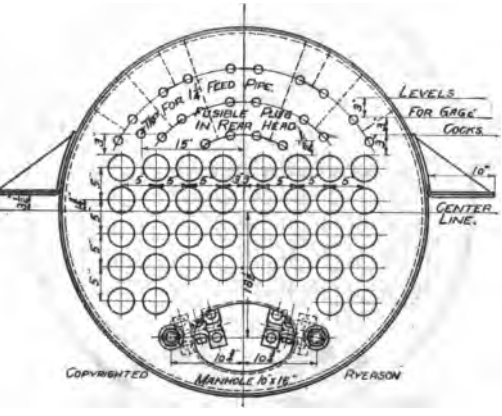
CHICAGO—JOSEPH T. RYERSON & SON—NEW YORK

BOILER HEAD DESIGN

CEPTABLE TO THE HARTFORD STEAM BOILER INSPECTION AND INSURANCE COMPANY

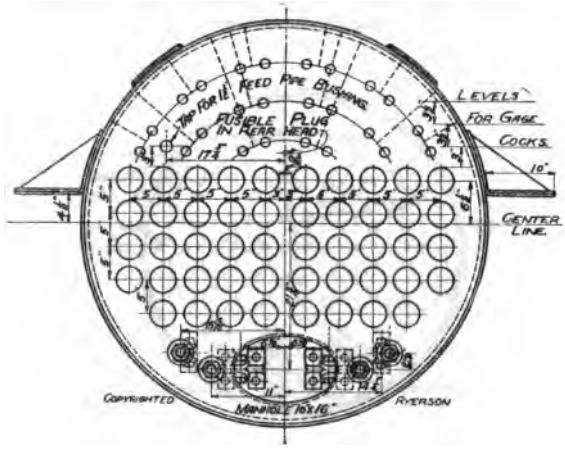


LL, 48 INCH DIAMETER 26 TUBES 4 INCH DIAMETER

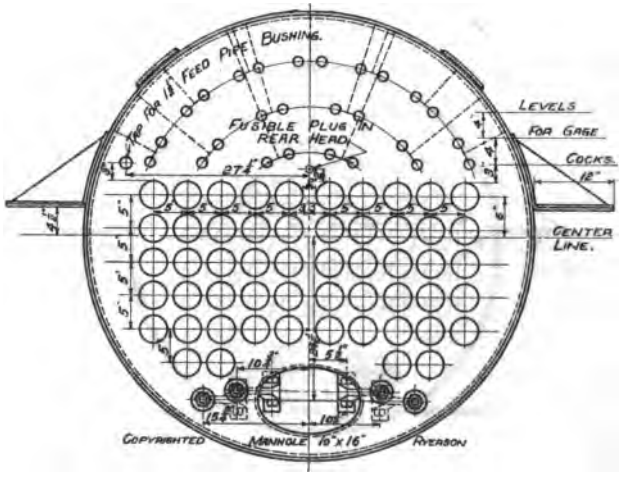


LL, 54 INCH DIAMETER 36 TUBES, 4 INCH DIAMETER

BOILER HEAD DESIGN
CONTINUED

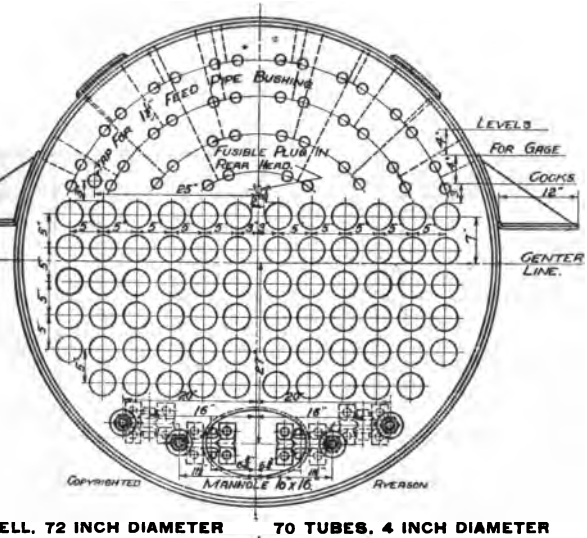


SHELL, 60 INCH DIAMETER 48 TUBES, 4 INCH DIAMETER

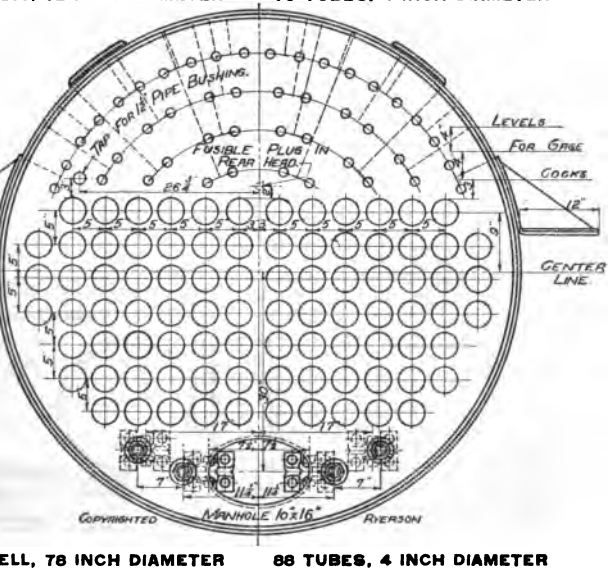


SHELL, 66 INCH DIAMETER 54 TUBES, 4 INCH DIAMETER

BOILER HEAD DESIGN
CONTINUED



ELL, 72 INCH DIAMETER 70 TUBES, 4 INCH DIAMETER

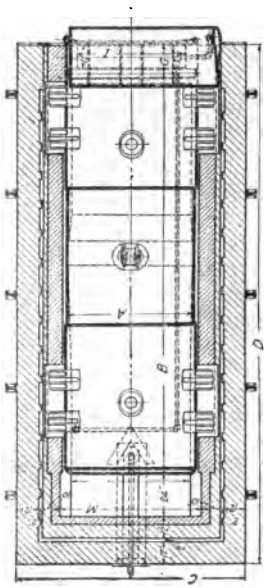


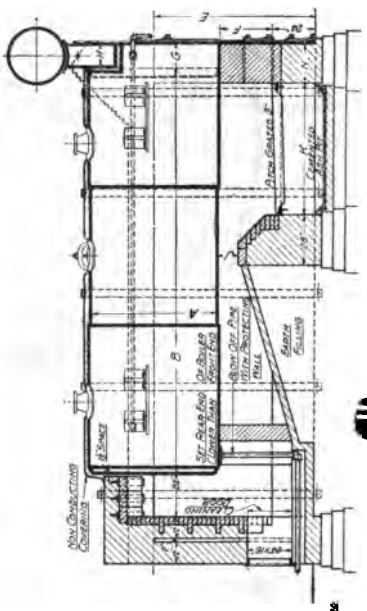
ELL, 78 INCH DIAMETER 88 TUBES, 4 INCH DIAMETER

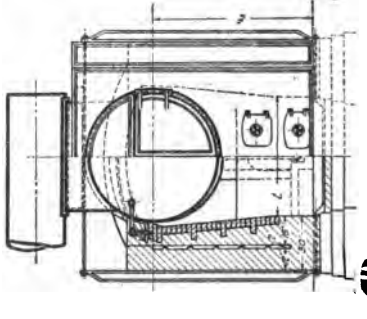
H. T. BOILER SETTING

ON LUGS AND WITH FLUSH FRONT

ACCEPTABLE TO THE HARTFORD STEAM BOILER INSPECTION AND INSURANCE COMPANY





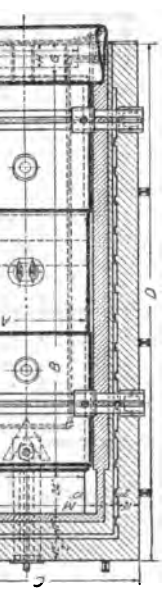


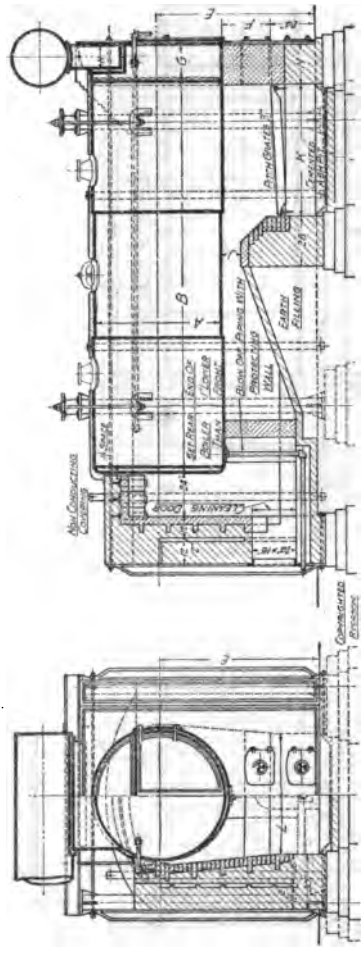
H.T. BOILER SETTING
ON LUGS AND WITH FLUSH FRONT
ACCEPTABLE TO HARTFORD S.B.I.&I.CO.

A	B	C	D	E	F	G	H	I	J	K	L	M	N
36	60-6	5-6	9-0	3-0	12	8	34	10	36	30		48	16
42	60-6	6-0	9-6	3-3	13	8	40	10	42	36		54	18
48	60-6	6-6	10-0	3-6	13	8	46	10	48	42		60	18
54	60-6	7-0	10-6	3-9	14	8	52	12	54	48		66	18
60	60-6	7-6	11-0	4-0	14	8	58	12	60	54		72	20
66	60-6	8-0	11-6	4-3	15	8	64	12	66	60		78	20
72	60-6	8-6	12-0	4-6	15	8	70	12	72	66		84	22
78	60-6	9-0	12-6	4-9	16	8	76	14	78	72		90	24
84	60-6	9-6	13-0	5-0	16	8	82	14	84	78		96	24
90	60-6	10-0	13-6	5-3	17	8	88	14	90	84		102	26
96	60-6	10-6	14-0	5-6	17	8	94	14	96	84		108	26

H. T. BOILER SETTING
CONTINUED

ON HANGERS AND WITH FLUSH FRONT





TYPICAL BOILER PLATE SPECIFICATIONS OF THE HARTFORD STEAM BOILER INSPECTION AND INSURANCE COMPANY

Shell plates shall be of Open Hearth Fire Box Steel, having a tensile strength of not less than 55,000 pounds, nor more than 62,000 pounds per square inch of section, and an elastic limit of not less than half the tensile strength, with not less than 56 per cent of ductility as indicated by contraction of area at point of fracture under test, and by an elongation of 25 per cent in a length of eight inches.

Each shell plate is to bear a coupon which shall be sheared off, finished up and tested by, or for, the maker of the boiler, at his expense. Each coupon is to fulfill the foregoing requirements as to strength and ductility, and stand bending down double when cold, when red hot, and after being heated red hot and quenched in cold water, without signs of fracture. There is not to be more than .035 per cent of sulphur, nor more than .035 per cent of phosphorus in the chemical composition of the plates and heads. All plates failing to pass these tests will be rejected. All tests and inspections of material may be made at the place of manufacture prior to shipment. Certified copies of report of said tests must be sent to the Hartford Steam Boiler Inspection and Insurance Company, and be approved, before any work is done on the boiler.

Heads shall be of best Open Hearth Flange Steel.

All plates both of shell and heads are to be plainly stamped with name of maker, brand and tensile strength; brands so located that they may be seen on each plate after the boiler is finished.

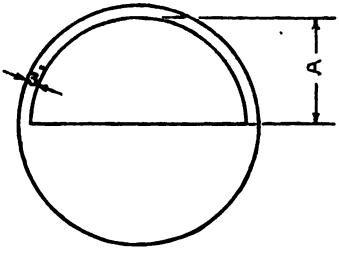
RULE FOR ASCERTAINING SAFE WORKING PRESSURE OF BOILERS, SHELLS, CYLINDERS OR TANKS

Multiply the ultimate tensile strength of the plates by the thickness in decimal of an inch and this product by the efficiency of the joint. Divide this product by one-half the inside diameter or radius of the shell and the result is the theoretical bursting pressure. The bursting pressure divided by the factor of safety gives the allowable or safe working pressure.

Expressed as an equation, this rule is:

$$\text{Safe Working Pressure} = \frac{\text{Tensile Strength} \times \text{Thickness} \times \text{Joint Efficiency}}{\text{Radius} \times \text{Factor of Safety}}$$

AREA OF BOILER SEGMENTS



AREA OF SEGMENT IN SQUARE INCHES FOR BOILERS FROM 36 INCHES TO 78 INCHES IN DIAMETER

Boiler	40 Inch Boiler	42 Inch Boiler	44 Inch Boiler	46 Inch Boiler	48 Inch Boiler	54 Inch Boiler	60 Inch Boiler	66 Inch Boiler	72 Inch Boiler	78 Inch Boiler
64	286	297	306	319	325	354	378	403	422	.....
93	319	331	343	354	364	394	423	449	473	.....
23	353	367	379	392	404	438	471	500	529	.....
54	386	399	415	431	444	482	517	553	583	.....
..	421	437	454	469	483	527	567	603	639	.....
...	454	473	491	509	523	573	616	658	695	.....
...	.....	.....	528	548	566	620	665	714	753	796
...	.....	.....	567	588	608	665	717	767	812	855
...	.....	.....	.....	.....	650	712	770	824	875	919
...	.....	.....	.....	.....	.....	760	821	882	932	985
...	.....	.....	.....	.....	.....	808	876	937	997	1051
...	.....	.....	.....	.....	.....	.....	927	996	1059	1118
...	.....	.....	.....	.....	.....	.....	982	1056	1121	1186
...	.....	.....	.....	.....	.....	.....	1037	1113	1184	1255
...	.....	.....	.....	.....	.....	.....	1090	1173	1248	1325
...	.....	.....	.....	.....	.....	.....	.....	1234	1316	1395
...	.....	.....	.....	.....	.....	.....	.....	.....	1381	1460
...	.....	.....	.....	.....	.....	.....	.....	.....	1446	1531
...	.....	.....	.....	.....	.....	.....	.....	.....	1510	1602
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	1674
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	1746

HEATING SURFACE, DIMENSIONS AND WEIGHTS OF STANDARD BOILER TUBES

Diameter		Thickness		Nominal Weight per Foot	Square Feet of Heating Surface per Foot of Length		Length of Tube in Feet, per Square Foot of Heating Surface	
Outside	Inside	Birmingham Gauge	Decimal of Inch		External	Internal	External	Internal
1	.810	13	.095	.90	.26	.21	3.84	4.72
1¼	1.060	13	.095	1.15	.33	.28	3.03	3.60
1½	1.310	13	.095	1.40	.39	.34	2.56	2.92
1¾	1.560	13	.095	1.66	.46	.41	2.18	2.45
2	1.810	13	.095	1.91	.52	.47	1.91	2.11
2¼	2.060	13	.095	2.16	.59	.54	1.70	1.86
2½	2.282	12	.109	2.75	.65	.60	1.54	1.67
2¾	2.532	12	.109	3.04	.72	.66	1.39	1.51
3	2.782	12	.109	3.33	.79	.73	1.25	1.37
3¼	3.010	11	.120	3.96	.86	.79	1.17	1.27
3½	3.260	11	.120	4.28	.92	.85	1.09	1.17
3¾	3.510	11	.120	4.60	.99	.92	1.01	1.09
4	3.732	10	.134	5.47	1.05	.98	.95	1.02
4½	4.232	10	.134	6.17	1.18	1.11	.85	.90
5	4.704	9	.148	7.58	1.31	1.23	.76	.81
6	5.670	8	.165	10.16	1.57	1.48	.64	.67
7	6.670	8	.165	11.90	1.83	1.75	.55	.57
8	7.670	8	.165	13.65	2.10	2.00	.48	.50
9	8.640	7	.180	16.76	2.37	2.26	.42	.44
10	9.594	6	.203	21.00	2.63	2.51	.38	.40
11	10.560	5	.220	25.00	2.89	2.76	.35	.36
12	11.542	4½	.229	28.50	3.15	3.02	.32	.33
13	12.524	4	.238	32.06	3.40	3.28	.29	.30

Weight may vary 5 per cent above, or 5 per cent below nominal weight given.

INDEX

	Page
A	
, Dome Plates	1215
Blocks	104
, Nikrome	104
Ingot Iron	306
oist	1188
ual Leg, Bar	203
rice	801
	810
s, Dimensions	1105
ual Leg, Structural	204
rice	801
	802, 813
g Variation, Warehouse	808
s, Dimensions	1105
oads	1122
nequal Leg, Bar	205
rice	801
	810
s, Dimensions	1106
nequal Leg, Structural	206
rice	801
	802, 813
g Variation, Warehouse	808
s, Dimensions	1106
oads	1124
orrugated	304
ircles	1008
B	
etal, Glyco	601
aight Length	112
	113
ized	113
Steel	809
Iron	815
s, Estimated	902
n Extras	815
e, Tank, Silo	523
el, Extras	809
d Drawn Round Shaft- (See Shafting)	116
n "A"	116
n "C"	117
Drawn Screw Steel	117
Twisted Square	105
rete Reinforcement	105
rices	801
	802
cations	845
Weights	904, 906
Wire	119
ing, Ryerson "A"	102
n "B"	103
n "C"	103
Cutting Rounds	106
Ovals, Weights	911
gons, Weights	910
Classification of Extras	814
hant	125
or Machine Steel	107
Weights	910
O. H. Reinforcing	105
tity Differentials	812
d, Weights	908
n	128
Bars, Smooth Finished Rounds	106
Bars, Square, Weights	909
Bars, Steel, Galvanized	114
Base Price	801
Cutting Extras	802
Classification of Extras	809
Specifications, Hot-Rolled	844
Base Prices	801
Bases for Columns, Cast Iron	1192
Beams, Bethlehem, Weights	1109
Beams	201
Base Prices	801
Extras	802, 813
Shearing, Variations, Warehouse	808
Weights, Dimensions	1101
Safe Loads	1112
Bethlehem Beams, Weights	1109
Bethlehem H Columns, Safe Loads	1180
Billets, O. H. Forging	101
Ryerson "A"	101
Ryerson "C"	101
Ryerson Special	101
Bits, Track, Dimensions, Prices	710
Blocks, Differential, Prices	714
Boiler Braces, Weights, Use	411
Boiler Flanges, Prices	408
Sizes and Spacing	1213
Boiler Hangers, Dimensions, Prices	406
Boiler Head Design	1217
Boiler Lugs, Dimensions, Prices	407
Boiler Nozzles, Dimensions, Prices	410
Boiler, Plates for Standard	216
Boiler, Safe Working Pressure	1224
Boiler Segments, Area	1225
Boiler Settings	1220
Boiler Steel, Hartford Specifications	1224
Boiler Steel, Manufacturers' Standard Specifications	839
Boiler, The Continental	404
Boiler Tubes (See Tubes)	401
Bolts, Boiler and Fitting Up, Prices	513
Bolts, Boiler Patch, Prices	417
Bolts, Boiler Stay, Prices	416
Bolts, Bridge and Roof, Dimensions	514
Bolts, Carriage, Prices	510
Bolts, Coupling, Prices	514
Bolts, Expansion, Prices	511
Bolts, Eye	608
Bolts, Machine, Prices	508
Extras	509
Weights	912
Bolts, Plow, Prices	513
Bolts, Round Head, Weights	914
Bolts, Stove, Price	512
Bolts, Strength	1209
Bolts, Track, Prices	526
Braces, Boiler Weights and Number used	411
Brackets, Column, Cast Iron	1193
Bursting Pressure, Tanks	1207
C	
Cap Screws, Prices	516

	Page
Cement, Joint	409
Chain	603
Channels, Rubber Tire	128
Channels	202
Base Prices	801
Extras	802, 813
Shearing Variations, Warehouse	808
Weights, Dimensions	1103
Safe Loads	1118
Channels, Small	202
Base Prices	801
Extras	802, 811
Circles, Circumferences and Areas	1008
Circumferences of Circles	1008
Clamps, 3-Bolt	608
Classification, Standard Steel	809
Clips, Malleable	608
Cold Drawn Steel (See Shafting)	116
Column Bases, Cast Iron	1192
Column Brackets, Cast Iron	1193
Columns, Cast Iron, Weights	1190
Columns, Double Angle, Safe Loads	1174
Columns, H, Safe Loads	1180
Columns, I Beam, Safe Loads	1168
Columns, Latticed Channel, Safe Loads	1152
Columns, Plate and Angle, Safe Loads	1140
Columns, Plate and Channel, Safe Loads	1154
Columns, Single Angle, Safe Loads	1172
Concrete Reinforcing (See Bars)	105
Connection for Beams and Channels	1185
Continental Boiler, The	404
Copper Ferrules, Prices	418
Corrugated Arches	304
Corrugated Ridge Roll	311
Corrugated Sheets (See Sheets)	313
Cosecants, Natural	1018
Cosines, Natural	1016
Cotangents, Natural	1014
Couplings	713
Covers, Manhole, Prices	412
Crabs or Yokes, Prices	414
Cranes, Rails, Clearances Dimensions and Wheel Loads	1194
Crayons, Marking	603
Cutting Extras, Bars and Small Shapes	811
Cutting Extras, Tool Steel	834
Cutting, Warehouse Extras	802, 808

D

Data, Boilers and Tanks	Sec. 12
Buildings and Bridges	Sec. 11
Miscellaneous	Sec. 10
Decimal Equivalents	1004
Die Blocks, Alloy	104
Dies	713
Dishing, Prices	822
Dome Plates, Allowance	1215
Drill Sleeves, Prices	709
Drill Sockets, Prices	709
Drilling Flue Holes, Prices	824
Drilling Pipe Flanges, Standards	1214
Drills, Twist, Dimensions, Prices	701
Taper Shank	701
Straight Shank	701
Enlarged Taper Shank	704
Straight Shank, Jobbers'	706

E

Ends, Upset, Dimensions	514
Engine Bolt Iron, Ulster	122
XX Engine Bolt Iron	124
Expanded Metal and Lath, Weights	606
Expanders, Tube, Prices	716
Extras, Mill, Structural	813
Extras, Mill, Rivets	829
Extras, Shafting, Cutting	808
Extras, Warehouse, Size, Shapes, Plates B. A. Sheets	802
Extras, Warehouse, Cutting	802

F

Fastenings, Wire Rope	608
Ferrules, Copper, Prices	418
Fire Box Plates, Hartford	219
Fittings, Wire Rope	608
Flanges, Boiler, Prices	408
Marine Prices	409
Tank, Prices	409
Boiler, Sizes and Spacing	1213
Pipe, Sizes and Spacing	1213
Flanging, Prices, Heads	823
Flue Holes	824
Floor Plates (See Plates)	220
Flue Holes, Prices, Flanging, Drilling, Punching	824
Flue Plugs, Prices	415
Foot, Decimal Equivalents, Inches	1005
Forges, Rivet	718
Forging Treatment, Tool Steel	1020
Forging Bars (See Bars)	102
Forging Billets (See Billets)	101
Formulae, Useful	1013
Freight Rates, Less Carload	803
Functions, Geometric	1013
Furnaces, Morison Corrugated	405
Fusible Plugs, Prices	415

G

Gallons in Cylindrical Tanks	1208
Gaskets	608
Gauges, Weights of Standard	901
Equivalents	1004
Girders, Bethlehem, Weights	1109
Girders, Box, Safe Loads	1132
Girders, Plate, Safe Loads	1130
Glyco Babbitt Metal	601

H

Handholes and Covers, Prices	414
Hangers, Boiler, Dimensions, Prices	406
Hangers, Joist	1189
Hangers, Loop, Dimensions, Prices	405
Hardening Treatment, Tool Steel	1020
H Columns, Safe Loads	1182
Head Design, Boiler	1217
Heads (See Plates)	208
Heating Surface, Boiler Tubes	1226
Hoists, Chain, Prices	714
Hoops, Soft Steel	114
Galvanized	114
Extras	817
Weights, Estimated	902

I

Ice, Slide Steel	128
Inch, Decimal Equivalents, Gauges	1004
Inch, Decimal Equivalents, Feet	1005
Inch, Decimal Equivalents, 64ths	1007
Ingot Iron, American	306

J

Joint Cement	409
Joints, Riveted	1201

L

	Page
Metal, Weights	606
Angers	405
and	608
oiler, Dimensions, Prices	407

M

	Page
es and Covers, Prices	412
cturers' Standard Specifi- tions, Structural Steel	835
r Steel	839
es, Variation	843
Rolled Bars	844
crete Reinforcing Bars	845
Flanges	409
Crayons (See Crayons)	603
ical Tubing, Extras	403
es	832
hts	915
nt Bar Iron	125
neous Stock	Sec. 6
Corrugated Furnaces	405

N

	Page
auges, Weights, Prices	604
anised	313
e C. H. Steel	104
e Forging Steel	104
Boiler, Dimensions, ices	410
ase Hardened, Dimensions, ices	521
heck and Jam, Dimensions, ices	521
old Punched, Dimensions, ices	520
ot Pressed, Prices	518
n Enlarged Holes, Prices	519
hts	913

P

	Page
s Carrier Track	128
olts, Boiler, Prices	417
olt Taps, Prices	417
ted Steel Sheets and Plates	607
anges, Sizes and Spacing	1213
dards for Drilling	1214
oes	523
Wrought, Weights and ices	830
Boiler, Hartford, Specifi- tions	1224
	208
e Prices	801
as	802, 821
ations and Allowances	808, 843
hts	922
American Ingot Iron	214
Dome, Allowance	1215
Flange Steel	218
Flat Circles	208
Heads, Flanged and ished	209
es	822
hts	916
Floor	220
roximate Weights	221
Loads	1184
or Standard Boiler	216
Hartford Fire Box	219
ifications	842
Long Lengths	215
Perforated	607
Sheared Stock	212
issible Variations	808, 843
weight Allowance	843
Tank Steel	212

	Page
Plates, Universal Rolled	210
Plugs, Flue, Prices	415
Plugs, Fusible, Prices	415
Post Caps	1189
Pressure, Bursting, Tanks	1207
Pressure, Safe Working, Boilers	1224
Pressure, Water	1216
Prices and Classifications	Sec. 8
Prices, Warehouse Base	801
Punches, Dies and Couplings	713
Punches, Screw, Dimensions, Prices	712
Punching Flue Holes, Prices	824

R

	Page
Rails	222
Reamers, Carbon, Taper Shank, Dimensions, Prices	708
Reamers, High Speed, Taper Shank, Dimensions, Prices	707
Reinforcing Bars (See Bars)	105
Ridge Roll, Corrugated	311
Rivet, Forges	718
Rivet Sets	711
Riveted Joints, Butt	1204
Riveted Joints, Lap	1201
Rivets, Boiler, Burden Iron	501
Rivets, Boiler, Cone Head	503
Dimensions	1001
Rivets, Mill Extras	829
Rivets, Round Head, Weights	914
Rivets, Shearing and Bearing Value	1002
Rivets, Spacing on Flanges	1213
Rivets, Steel, Countersunk Head	505
Rivets, Structural Steel, Round Head	504
Dimensions	1001
Rivets, Tank and Sheet, Cone Head	505
Round Head	506
Pan Head	506
Flat Head	507
Countersunk Head	507
Wagon Box Head	507
Prices	828
Rivets, Tinners' or Pound	505
Prices	829
Rods, Suspension, Strength	1209
Roofing Sheets, Corrugated	313
Roofing Sheets, Stamped	314
Rope Fittings	608
Rope Wire	608

S

	Page
Saddle Plates for Manholes, Prices	413
Safe Loads, Explanation of	1111, 1139
Saw Blades	113
Extras	816
Screen Bars	128
Screens, Weights	606
Screw Punches, Dimensions, Prices	712
Screws, Cap, Prices	516
Screws, Coach and Lag, Prices	511
Weights	913
Screws, Set, Prices	517
Screw Steel, Cold Drawn	117
Secants, Natural	1018
Segments, Boiler, Area of	1225
Separators, Standard Steel	1186
Set Screws, Prices	517
Sets, Rivet	711
Settings, Boiler	1220
Shafting, Cold Drawn	116
Discount	801
Cutting Extras, Warehouse	808
Prices	819
Cutting Extras, Mill	820
Shearing, Standard Variations	808

	Page
Sheets, Auto Stock, Patent Leveled	308
Sheets, Black	301
Base Price	801
Extras	802, 826
Weights	918
Sheets, Blue Annealed	301
Sheets, Blue Annealed Ingot Iron	307
Sheets, Corrugated Roofing	313
Corrugated Weights	922
Safe Loads	1184
Sheets, "C" Pickled	310
Sheets, Electrical	311
Sheets, Extra Deep Stamping and Spinning	308
Sheets, Galvanized Ingot Iron	307
Roofing	313
Sheets, Galvanized	305
Base Price	801
Extras	802, 827
Weight	920
Sheets, Lead Finish, Long Ternes	309
Sheets, Locomotive Jacket Iron	312
Sheets, Metallic Furniture	309
Sheets, One Pass Cold Rolled	303
Sheets, Perforated	607
Sheets, Roofing and Siding	314
V Crimped	314
Beaded	314
Rock Faced Brick	314
Plain Brick	314
Rock Faced Stone	314
Sheets, Siding, Stamped	314
Sheets, Special Grade	306
Sheets, Uniform Blue	309
Sheets, Wellsville Polished	312
Sheets, Wood's "A" Planished Locomotive Jacket Iron	312
Sheets, Wood's "A" Planished Iron	312
Sheets, Wood's Refined	310
Shields and Bolts, Prices	511
Shimming Spikes (See Spikes)	526
Shoes, Pipe	523
Siding Sheets, Stamped	314
Sines, Natural	1016
Sledge Shoe Steel	128
Sleeves, Drill, Prices	709
Small Tools	Sec. 7
Sockets, Drill, Prices	709
Specifications, Fire Box Steel	842
Specifications, Hartford Boiler Plate	1224
Specifications, Manufacturers' Standard	835
Spikes, Boat, Prices	526
Spikes, Shimming, Prices	526
Spikes, Track, Prices	526
Stair Treads	221
Standard Gauges, Weights	901
Standard Iron Classification, Extras on Bars, Small Shapes	814
Standard Specifications, Manufacturers'	835
Standard Steel Classification, Extras on Bars, Small Shapes	809
Standpipes, Proportions of	1210
Standpipes, Weights of	1211
Staybolt Iron, Ulster Special	122
Stay Bolt Taps, Prices	416
Stay Bolts, Boiler, Prices	416
Stays, Strength of	1209
Stirrups	1189
Strand, Galvanized, Weights, Prices	812
Stresses, Allowable Working Unit	1196
Strip Steel, Cold Rolled	118
Extras	818
Structural Shapes	201
Manufacturers' Standard Specification	835
Shearing Variation, Warehouse	808
Struts, Safe Loads	1172
Studs, Milled Iron, Prices	515
Steel	515
Swedish and Norway Iron	126
Extras	816

T

	Page
Tangents, Natural	1014
Tanks, Bursting Pressure	1207
Tank, Flanges, Prices	409
Tanks, Gallons in	1208
Tanks, Steel, Definition	215
Taps, Patch Bolt, Prices	417
Taps, Stay Bolt, Prices	416
Tees, Bar Mill Sizes	207
Base Price	801
Extras	802, 811
Weights, Dimensions	1107
Tees, Structural	207
Base Price	801
Extras	802, 813
Shearing Variations	808
Weights, Dimensions	1107
Safe Loads	1128
Thimbles	608
Threading, Stay Tubes, Prices	825
Tie-Straps	1188
Tire	127
Extras	813
Tire, Channels	128
Tool Steel	120
Tool Steel, Cutting Extras	834
Tool Steel, Classification	834
Tool Steel, Forging Treatment	1020
Tool Steel, Hardening Treatment	1020
Tools, Small	Sec. 7
Track Bits, Flat, Dimensions, Prices	710
Track Bolts, Prices	526
Track Spikes	526
Treads, Stair	221
Trolleys, Prices	715
Tube Expanders, Prices	717
Tubes, Boiler	401
Prices	801, 825
Weights, Dimensions	1226
Heating Surface	1226
Tubes, Threading Stay, Prices	825
Tubing, Mechanical, Extras	403, 833
Prices	832
Weights	915
Turnbuckles, Hook and Eye, Prices	608
Turnbuckles, Dimensions, Prices	522

U

	Page
Ulster and Ulster Special Iron	122
Unit Stress, Allowable Working	1196

V

	Page
Variations, Sheared Plates	843

W

	Page
Wagon Box Iron	113
Washers, Cast Iron, Dimensions, Weights	524
Washers, Lead, Galvanized with Nails	313
Washers, Malleable Iron, Dimensions, Weights	524
Washers, Standard Wrought, Dimensions, Price, Weight	525
Washers, Star	524
Weights	Sec. 9
Wire Cloth, Prices	605
Wire, Black Finish Annealed	105
Cold Rolled Flat	119
Wire Gauges, Prices	604
Wire Rope and Fittings	608
Wrought Pipe, Weights and Prices	830

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